SEAL OF MISSOURI STATE BOARD OF AGRICULTURE
1865

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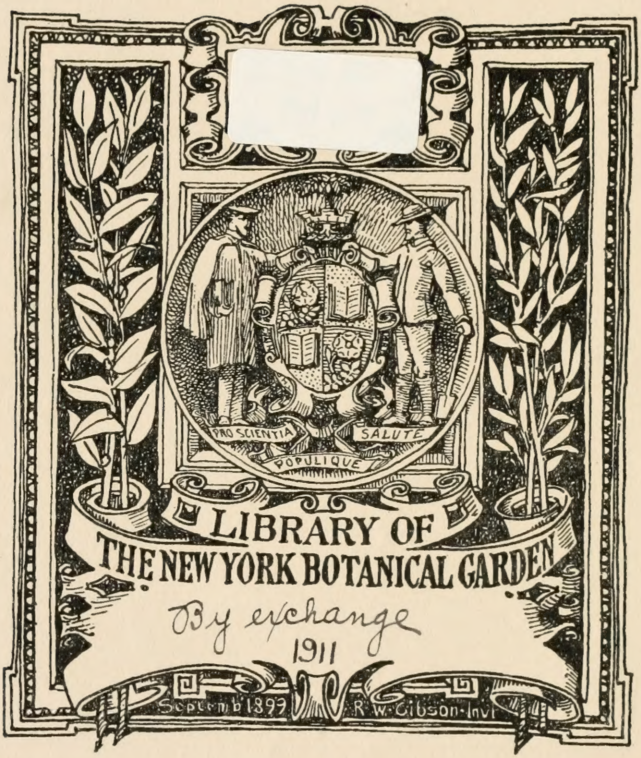
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W. A. BRIGHT
TREASURER

CURTIS HILL
HIGHWAY ENGINEER

DR. D. F. LUCKEY
STATE VETERINARIAN

S. M. JORDAN
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CORPORATE MEMBERS, BOARD OF AGRICULTURE.

FORTY-THIRD ANNUAL REPORT

OF THE

MISSOURI

State Board of Agriculture

A Record of the Work for the Year 1910

ALSO REPORT OF MISSOURI FARMERS' WEEK, 1911, TOGETHER WITH CENSUS
RETURNS, FARM STATISTICS AND OTHER INFORMATION
AND PAPERS RELATING TO AGRICULTURE
AND ITS ALLIED INDUSTRIES.

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OFFICERS OF THE STATE BOARD OF AGRICULTURE

President—W. C. Hutchison, Jamesport.
Vice-President—P. P. Lewis, Crescent.
Secretary—T. C. Wilson, Columbia.
Assistant Secretary—W. L. Nelson, Columbia.
Institute Director—S. M. Jordan, Columbia.
Treasurer—W. A. Bright, Columbia.
State Veterinarian—Dr. D. F. Luckey, Columbia.
State Highway Engineer—Curtis Hill, Columbia.
State Apiary Inspector—M. E. Darby, Springfield.

EXECUTIVE COMMITTEE.

W. C. Hutchison, Jamesport,
P. P. Lewis, Crescent,
E. L. Newlon, Lewiston,
F. B. Mumford, Columbia,
Chas. Householder, Thompson,
Fred. T. Munson, Osceola.

EX OFFICIO MEMBERS.

Governor of Missouri, Herbert S. Hadley. Superintendent of Schools, Wm. P. Evans. Dean Agricultural College, F. B. Mumford.

CORPORATE MEMBERS.

(Term expires July 20, 1911.)

Cong. Dist.	Name.	Residence.	County.
2	W. C. Hutchison	Jamesport	Daviess.
3	A. M. Thompson	Nashua	Clay.
5	J. B. Sampson	Lee's Summit	Jackson.
13	E. E. Swink	Farmington	St. Francois.
14	R. A. Young	Alton	Howell.
16	A. T. Nelson	Lebanon	Laclede.

(Term expires July 20, 1912.)

1	E. L. Newlon	Lewiston	Lewis.
4	Geo. H. Sly	Rockport	Atchison.
7	N. H. Gentry	Sedalia	Pettis.
8	W. A. Dallmeyer	Jefferson City	Cole.
15	S. Mc. Smith	Reeds	Jasper.

(Term expires July 20, 1913.)

6	Fred T. Munson	Osceola	St. Clair.
9	Charles Householder	Thompson	Audrain.
10	P. P. Lewis	Crescent	St. Louis.
11	Norman J. Colman	St. Louis City	821 Holland Bdg.
12	W. R. Wilkinson	St. Louis City.	

OFFICERS OF STATE FAIR DIRECTORY.

President—W. A. Dallmeyer, Jefferson City.
Vice-President—Sanford Mc. Smith, Reeds.
Secretary—John T. Stinson, Sedalia.
Treasurer—W. H. Powell, Sedalia.

EXECUTIVE COMMITTEE STATE FAIR DIRECTORY.

W. A. Dallmeyer, Jefferson City.
Sanford Mc. Smith, Reeds.
W. R. Wilkinson, St. Louis.
A. T. Nelson, Lebanon.
N. H. Gentry, Sedalia.
E. E. Swink, Farmington.
R. A. Young, Alton.
Geo. H. Sly, Rockport.
Norman J. Colman, St. Louis (Honorary).

STATE VETERINARIAN AND DEPUTIES.

Name.	Address.
D. F. Luckey, State Veterinarian	Columbia
W. F. Berry	Joplin
Henry Boettner	Perryville
Horace Bradley	Windsor
E. Brainerd	Memphis
L. D. Brown	Hamilton
Jno. W. Chenoweth	Albany
L. G. Clark	Nevada
D. W. Criswell	Savannah
D. E. Crites	Jackson
James Cullison	Charleston
B. C. Davis	Carrollton
A. C. Donohew	Boonville
Joseph Emonts	O'Fallon
G. P. Gant	Kirksville
A. D. Glover	Newark
J. W. George	Harrisonville
L. B. Graham	Salisbury
Paul S. Grigsby	Louisiana
A. J. Hammerstein, 2437 Lemp Ave	St. Louis
E. M. Hendy	Jefferson City
A. W. James	Cameron
R. F. Kelso	Powersville
O. U. Lash	Moberly
G. H. Leach	Maryville

Geo. W. Leber	Pacific
W. J. Lopp	Warsaw
R. B. Love	Springfield
J. H. McElroy	Grant City
J. H. McLevey	Warrensburg
E. P. Maitland	LaPlata
W. E. Martin	Perry
Boyd Miller	California
David G. Moberly	St. Joseph, Seventh and Sylvania Sts.
R. C. Moore	Kansas City, 1336 E. 15th St.
A. J. Munn	Fayette
Olin T. Murphy	Kahoka
Walter N. Neil	Lancaster
F. W. O'Brien	Hannibal
F. E. Peacock	Fairfax
Aug. Pittman	Troy
R. P. Poage	Shelbina
Jno. W. Riley	Wright City
Walter N. Russell	West Plains
F. W. Rutherford	Maysville
D. E. Sawyer	Sikeston
H. J. Sebaugh	Farmington
C. N. Scott	Mound City
J. H. Scott	Princeton
Jno. R. Seipel	Poplar Bluff
Samuel Sheldon	Trenton
A. E. Shikles	Dearborn
J. H. Slater	Richmond
Thos. M. Smiley	Liberty
L. C. Smith	Hamilton
Stanley Smith	Columbia
W. C. Sorber	St. Louis, 2300 Salisbury St.
T. N. Spencer	Rich Hill
F. M. Starr	Odessa
Oscar Stewart	Paris
C. A. Treadway	Canton
H. C. Tuck	Morrisville
Harry C. Utley	Bolivar
A. E. Van Antwerp	Brookfield
H. P. Waddle	Osceola
E. B. Ward	Fulton
H. C. Ward	Perry
W. B. Welch	Marshall
T. E. White	Sedalia
Arthur E. Wilson	Weaubleau
H. H. Wolf	Mexico
F. A. Wolfe	Linneus

ASSOCIATE ORGANIZATIONS.

MISSOURI CORN GROWERS' ASSOCIATION.

President—F. H. Crowell, Butler.
Vice-President—O. J. White, Fairfax.
Secretary-Treasurer—C. B. Hutchison, Columbia.
District Vice-President—W. H. Brown, Clarksville.
District Vice-President—Sanford Mc. Smith, Reeds.
District Vice-President—M. McCauley, Doniphan.
District Vice-President—Christ. Ohlendorf, Boonville.

MISSOURI FARM MANAGEMENT ASSOCIATION.

President—R. S. Harriman, Pilot Grove.
Vice-President—T. C. Cochran, Lockwood.
Secretary-Treasurer—Don G. Magruder, Columbia.
Advisory Board—D. H. Doane, Columbia; F. B. Mumford, Columbia; Dr. W. P. Dysart, Columbia.

ASSOCIATION OF MISSOURI COUNTY FAIRS.

President—J. Allen Prewett, Independence.
Secretary—E. A. Trowbridge, Columbia.
Treasurer—B. E. Hatton, Columbia.

MISSOURI CATTLE FEEDERS' ASSOCIATION.

President—S. P. Houston, Malta Bend.
Vice-President—Stone W. McClure, LaMonte.
Vice-President—M. T. Gill, Perry.
Secretary-Treasurer—H. O. Allison, Columbia.

MISSOURI HIGHWAY ENGINEERS' ASSOCIATION.

(Meeting held at Cape Girardeau.)

President—F. W. Latimer, Marshall.
Vice-President—L. D. Williams, Macon.
Secretary—J. M. Clack, Nevada.
Treasurer—P. S. Quinn, Columbia.

MISSOURI HOME MAKERS' CONFERENCE.

President—Miss Alice E. Kinney, New Franklin.
Vice-President—Mrs. W. C. Hutchison, Jamesport.
Secretary—Miss Pearle Mitchell, Rocheport.
Executive Board—Mrs. N. H. Gentry, Sedalia; Mrs. F. B. Mumford, Columbia; Mrs. H. C. Harvey, Kirksville.

MISSOURI WOMEN FARMERS' CLUB.

President—Miss Pearle Mitchell, Rocheport.
Secretary-Treasurer—Miss Alice E. Kinney, New Franklin.
Executive Board—Mrs. R. B. D. Simonson, Jefferson City; Mrs. Cora F. Shewell, Shewell Station; Mrs. C. A. Cook, Centerview.

MISSOURI SHEEP BREEDERS' ASSOCIATION.

(Meeting held at Sedalia.)

President—John A. Rankin, Tarkio.
Vice-President—William Sweeney, Chilhowee.
Secretary-Treasurer—M. V. Carroll, Sedalia.
Directors—R. B. Noel, Monticello; T. J. Burrus, Prairie Home; S. E. Haseltine, Springfield; A. T. Grimes, Greenwood; J. W. Elliott, Polo; Harry Nance, Pattonsburg.

MISSOURI STATE DAIRY ASSOCIATION.

President—P. P. Lewis, Crescent.
Vice-President—Rudolph Miller, Macon.
Second Vice-President—Chas. Busch, Washington.
Secretary—Dr. W. P. Cutler, Columbia.
Treasurer—I. T. Van Note, Columbia.

MISSOURI DRAFT HORSE BREEDERS' ASSOCIATION.

President—J. F. Roelofson, Maryville.
Vice-President—Chas. Holland, Springfield.
Secretary-Treasurer—E. A. Trowbridge, Columbia.

OTHER ASSOCIATIONS.

The following associations either did not elect officers or failed to hold meetings during the 1911 Farmers' Week.

Missouri Swine Growers' and Breeders' Association, Missouri Saddle Horse Breeders' Association, Missouri Jersey Breeders' Association, Improved Live Stock Breeders' Association.

LETTER OF TRANSMITTAL.

State Board of Agriculture, Office of the Secretary,
Columbia, Mo., March 20, 1911.

To Honorable Herbert S. Hadley, Governor of Missouri:

Sir—I have the honor to transmit to you a report of the State Board of Agriculture for the year 1910, including the work of the State Veterinarian, State Highway Engineer, State Dairy Commissioner and State Apiary Inspector.

Very truly yours,
T. C. Wilson, Secretary.

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ANNUAL MEETING.

MINUTES OF PROCEEDINGS.

State Board of Agriculture, Office of the Secretary,
Columbia, Mo., January 10, 1911.

The Board met on the above date and was called to order by President Nelson. The following members answered to the roll call: Messrs. Mumford, Newlon, Hutchison, Sly, Sampson, Munson, Gentry, Dallmeyer, Householder, Lewis, Wilkinson, Swink, Young, Smith and Nelson. Absent, Messrs. Hadley, Evans, Thompson and Colman.

The reading of the minutes of the last annual meeting was dispensed with, and the minutes shown in the 42nd annual report were approved.

The Secretary's report was then read, and, on motion duly made and carried, the report was accepted and ordered printed.

Dr. D. F. Luckey, State Veterinarian, then read his report for the year of 1910 and, on motion of Judge Wilkinson, the report was accepted and ordered printed.

After some discussion of the quarantine regulations it was ordered that a committee be appointed and known as the Committee on Quarantine Regulations. The President then appointed Messrs. Gentry, Dallmeyer and Smith as such committee.

The hog cholera question was then taken up and, after considerable discussion, Messrs. Young, Sly and Newlon were appointed as a Committee on Hog Cholera, with power to act.

Mr. Curtis Hill then presented his report as State Highway Engineer for the year 1910, and, on motion by Mr. Lewis, the report was accepted and ordered printed.

Dr. W. P. Cutler then read his report, as Dairy Commissioner for the year 1910, and, on motion of Mr. Smith, the report was accepted and ordered printed.

Mr. M. E. Darby, State Apiary Inspector, made a verbal report, his written report having been lost en route, and was granted the privilege of submitting his written report to the Secretary later and having the same printed.

Mr. Lewis of the Committee on Agricultural College then read the following report of the committee, and, on motion duly made and carried, the report was accepted and ordered printed:

Report of Committee on Agricultural College.

The special committee of the Board provided for by the laws of Missouri have made a careful investigation of the progress and needs of this Institution and submit the following report:

Your committee has found all the affairs of the College of Agriculture and Experiment Station in most excellent condition. There has been a very large increase in the enrollment of students in all departments of the College of Agriculture. The enrollment in the College of Agriculture during the current session to date has reached 652. This is an increase of over 25 per cent in the enrollment of students over last year. This very large increase in the enrollment has taxed the facilities of the college laboratories, class rooms and equipment to the utmost. The facilities for instruction in such practical subjects as live stock judging and dairying husbandry have already been overtaxed, and a few students have been unable to secure instruction in these subjects because of lack of equipment. This is a situation which the Legislature of the State should correct immediately.

The instruction and investigation carried on in the College of Agriculture is fundamentally important to the future growth and progress of Missouri, and the State cannot afford to deny instruction to all young men applying for admission to the College of Agriculture.

A record of the work of the College of Agriculture during the past year shows that the institution is becoming more and more valuable to the farmers of the State. In no previous year has the College undertaken so much co-operative instructional and investigational work directly with the farmers in the various sections of Missouri.

The College of Agriculture during the past year has achieved a notable victory by winning the live stock judging contest at the International Live Stock Show at Chicago. In this contest nine institutions competed. Missouri not only won by a margin of 250 points, but also had the unusual distinction of having the four highest men in the contest.

We also commend the work of the College of Agriculture in developing the champion dairy cow of the world. The record of Missouri Chief Josephine, owned and developed by the Department of Dairy Husbandry, has been of great value in developing confidence in the minds of the farmers of Missouri in the practical character of the instruction of the College.

Men from the College of Agriculture have delivered 460 public addresses in almost every section of the State. More than 500,000 people attended the meetings addressed by the men from the College of Agriculture. In eleven days' time five men from the College of Agriculture talked to 28,000 people from special trains provided by the Frisco, Burlington and Sante Fe railroads.

Two night schools of Agriculture were held—one in St. Louis, the other in Kansas City. More than 2,500 people were enrolled for regular instruction in these two schools.

Expert judges from the Department of Animal Husbandry were sent to 42 county fairs in Missouri during the season of 1910. Requests for expert judges from the College of Agriculture were received from over 50 county fair associations in Missouri. This work is particularly useful in standardizing the live stock types of the State and in demonstrating the efficiency of improved live stock. In doing this judging work 14 men worked a total of 111 days and judged 7,852 animals. 304,000 people attended these fairs.

The Department of Agronomy supplied expert judges for 67 corn shows in the State. This work required 77 days. There were 7,216 exhibits and 254,000 people attending these shows. In 1910, 3,000 Missouri boys and young men enrolled in corn growing contests under the direction of the College of Agriculture. Full information for planting, cultivating and harvesting were furnished by the College. More than 100 of these boys later attended the Short Winter Course at Columbia. The first Farmers' Short Course ever given by the Missouri College of Agriculture was held during Farmers' Week in December, 1909. More than 600 persons enrolled for systematic instructtion in Agriculture. During the same time a boys' short course in grain and live stock judging was conducted. Thirty-one boys were enrolled in this course.

Each summer from June to August the College of Agriculture offers special courses to teachers with a view to preparing them to teach Agriculture in the rural and high schools of Missouri. More than 150 teachers were enrolled in these courses in 1910.

We congratulate the College of Agriculture upon the work accomplished and commend the purpose of the institution in carrying the results of its investigation directly to the farmers in various parts of the State.

In our judgment the most important division in the College of Agriculture is the Agricultural Experiment Station. The Experiment Station is the creator of new knowledge. It investigates fundamental problems and is of the utmost importance in the development of Agriculture as a vocation and of Agricultural instruction.

The Missouri Experiment Station is successfully conducting investigations in Animal Nutrition, Dairy Husbandry, Veterinary Science, Horticulture, Entomology, Farm Management and in Agricultural Chemistry. The results of investigations are published in bulletins which are widely distributed in the State.

During the past year the Experiment Station has published 21 bulletins and circulars of information.

Some of the more important lines of work which have been directly concerned with the agricultural activities of Missouri farmers are the following:

During the past year the Agricultural Experiment Station has inoculated more than 40,000 hogs with hog cholera serum. From 80 to 85 per cent of these animals have been saved. By this means alone more than $500,000 has been added to the wealth of Missouri. The appropriation of $10,000 made by the Missouri Legislature was insufficient to meet the demands of farmers for hog cholera serum. In order to supply serum to those making application it was necessary for the College of Agriculture to charge 75 per cent of the cost of production. We approve this plan and recommend that hereafter the serum be sold to farmers at cost, thus relieving the Legislature of further appropriations for this work.

The work of making an agricultural soil survey of Missouri has been carried forward with a vigor during the year. The importance of this work and efficiency with which it has been conducted in Missouri has induced the United States Department of Agriculture to cooperate in carrying forward this important investigation. Six bulletins have already been published on the results of the soil survey work in the State. Careful and detailed surveys of individual counties are now being made, and this work, when completed, will be of the greatest economic benefit to Missouri.

In 1910 there were 66 men in 105 counties cooperating with the central

Experiment Station at Columbia in experiments to determine the best methods of farming. In carrying forward this work 3,000 different packages of seeds were used and more than 20,000 pounds of fertilizer. These cooperative experiments include investigations in soils, farm crops, fruit growing, dairy and animal husbandry.

In one year's time men in the College of Agriculture have received and answered 40,000 letters and post cards. In most cases personal replies have been made to definite questions in regard to agriculture. The correspondence of men in the College of Agriculture has doubled in the past twelve months.

The College established a department of Farm Management in June, 1910. This committee especially commends the establishment of this new and practical department, and believes that the work of this department will be most important in applying the work of the College directly to the farm problems of Missouri.

We also note with approval the establishment of a new department of Forestry. The Forestry resources of Missouri have been too long neglected and the University has acted wisely in establishing this new department for the promotion of this important work.

Your committee finds in every department an increased activity of the College of Agriculture and Experiment Station, larger plans, increased enrollment of students, greater demands upon the time and services of men, and a greater demand on the part of farmers for the solution of the farm problems of the State and for information on all agricultural subjects. We strongly recommend, therefore, that the Board of Agriculture use its influence with the Legislature to increase the appropriations available for the work of the College of Agriculture. The crowded condition of the class rooms and laboratories makes it imperative that more room be provided at an early date. The greatly increased enrollment in the Short Course makes it necessary to provide larger appropriations for the development of this work, otherwise Missouri boys must be denied instruction in Agricultural work. With the full approval of this committee the following appropriations, which, in our judgment, ought to be made available by the Legislature now in session in Jefferson City, are recommended:

Addition to Horticultural building	$60,000
Building for Agricultural Chemistry	60,000
Dairy barn	20,000
Live Stock Judging Pavilion	25,000
Completion of Veterinary building	5,000
Soil Survey	15,000
Outlying Experiments	20,000
The Experiment Station	25,000
Two Year Short Winter Course	15,000
Laboratories and Equipment, College of Agriculture	15,000
Poultry Department	5,000
Agricultural Library	3,000
Animal Husbandry, including purchase of live stock	15,000
Dairy Husbandry	5,000
Total	$288,000

Respectfully submitted,
W. R. WILKINSON,
PHILANDER P. LEWIS,
GEO. H. SLY.

On motion of Mr. Dallmeyer, it was ordered that 1,000 copies of the Agricultural College Report be printed and distributed to the members of the Legislature and other State officers and members of the Board.

The organization of a State Association of County Fairs was then discussed and several bills were suggested for the consideration of the present Legislature. On motion of Mr. Sly, it was ordered that all bills on the subject of County Fairs be referred to the Legislative Committee with full power to act.

A letter was read from Mr. Babb of Kirkwood asking for authority to remove a certain class of hogs from the St. Louis stock yards to his feedings pens, and, on motion of Dean Mumford, the whole matter was referred to Dr. Luckey.

REPORT OF AUDITING COMMITTEE.

The Auditing Committee reported as follows:

To the Board of Agriculture: We, the undersigned members of the committee appointed by the President to examine the financial statements of the Secretary and Treasurer, and to inspect the warrants drawn by the Executive Committee, have examined the same and find that the books of the Secretary agree with the financial statement submitted, and the same agrees with the report of the Treasurer of the Board.

The following warrants, which had been issued at the last annual statement, but had not been presented for payment, we find have since been paid:

EXPENSE OF MEMBERS FUND.

No. 785	$8.50

OFFICE EXPENSE FUND.

No. 783	$14.13

STATE VETERINARY FUND.

No. 2363	$67.90
No. 2364	20.27
No. 2366	20.88

The following warrants, for which corresponding vouchers are on file with the Secretary, have not been presented to the Treasurer for payment:

EXTENSION FUND.

No. 58	$23.08
No. 63	44.20

When these warrants have been presented to and paid by the Treasurer, there will be an exact agreement in balances.

Respectfully submitted,
W. C. HUTCHISON,
CHAS. HOUSEHOLDER,
Committee.

Upon motion, report was adopted and committee excused.

ELECTION OF OFFICERS.

Mr. Hutchison was nominated for the office of President, and on motion of Judge Wilkinson, the rules were suspended and Mr. W. C. Hutchison was elected President.

Mr. P. P. Lewis was then placed in nomination for Vice-President, and, on motion of Mr. Smith, the rules were suspended and Mr. Lewis was elected Vice-President.

On motion of Judge Wilkerson, and seconded by Mr. Gentry, the rules were suspended and T. C. Wilson was elected Secretary.

On motion of Judge Wilkinson, seconded by Mr. Lewis, Mr. W. L. Nelson was elected Assistant Secretary.

On motion of Mr. Young, seconded by Mr. Sly, Mr. W. A. Bright was elected as Treasurer.

On motion duly made and carried, Mr. M. E. Darby was elected to the office of Apiary Inspector for two years from January 1st, 1911.

On motion of Judge Wilkinson, the Executive Committee was made up of the President, Vice-President, Dean F. B. Mumford, Chas. Householder, Fred T. Munson and E. L. Newlon.

On motion duly made and carried, it was ordered that the Secretary furnish the Board members with the minutes of committee meetings.

Dr. Luckey made a report on the quarantine regulations and recommended certain changes and a new proclamation be issued by the Governor. On motion of Mr. Lewis, supported by Mr. Newlon, it was so ordered.

On motion of Mr. Lewis, seconded by Mr. Dallmeyer, the Committee on Hog Cholera was given time to thoroughly investigate the situation, and were authorized to go to any place to ascertain the true conditions and to report during the sitting of the present Legislature.

On motion duly made and carried, the Executive Committee was authorized to act for the full Board in all questions requiring attention before a full board meeting could be had.

On motion of Mr. Lewis, it was ordered that Hog Cholera serum be manufactured by the College of Agriculture, as in the past, and distributed and sold to farmers at cost.

On motion of Mr. Sly, supported by Mr. Gentry, it was ordered that Mr. S. M. Jordan's salary be made $2,400.00 a year, beginning January 1st, 1911, on the condition of a satisfactory increase in the appropriations for Farmers' Institutes.

On motion of Mr. Dallmeyer, supported by Mr. Lewis, the President was authorized to arrange the Legislative Committee to suit his wishes.

W. A. Dallmeyer, W. R. Wilkinson, A. T. Nelson, P. P. Lewis, S. Mc. Smith and Dean F. B. Mumford were named as members of the Legislative Committee.

There being no further business, the Board adjourned.

Respectfully submitted,
T. C. Wilson,
Secretary.

REPORT OF SECRETARY.

Gentlemen of the Board of Agriculture:

The year 1910 has gone into history and the 45th year of your existence has closed. We are met today in the 46th annual session to review the work of the past year and to consider ways and means for carrying on the work of the Board during 1911. I shall not attempt to speak of the work done by your Board in the past nor the great good resulting therefrom. Rather would I direct your attention to the work that is before us, and in all confidence let me hope that your efforts in the future will be crowned with even greater success and more beneficial results than those of the past.

At your last annual meeting you were called on to accept the resignation of your secretary who had served you ably for eight years. You also at that same meeting elected me to fill the office made vacant by the resignation of Mr. Ellis. I took charge of this office on March 2, 1910, and have rendered to the Board the best service of which I am capable. In every department, and from every assistant and every employee, I have had the most loyal support, and the year has closed with perfect harmony and good feeling.

The results of the year's work have not been all that we hoped for, yet we can show very decided and gratifying results in most of the work.

FARMERS' INSTITUTE WORK.

The Farmers' Institute work has been especially active and the only limitation on the extent of this work has been that of human endurance. Our men have been worked to the limit of their physical capacity. The time was when we had to ask for a hearing or an opportunity to present new ideas. But it is not that way now. We no longer have to beg for a hearing, but we have great difficulty in getting enough good men to supply demands on us for speakers. On one day in November we had twelve institutes in as many different places in Missouri and two other places were disappointed that day because we could not supply speakers. During the year the Board has put on some 300 institutes with an estimated attendance of something like 40,000. We have great need of more men who are especially equipped for the various lines of the business of agriculture. We especially need a broad-minded and well trained live stock man who can talk the live stock business and who can judge all kinds of stock. This Board ought to secure appropriation to employ such a man all the year. When not employed at county fairs awarding premiums on live stock exhibits he could do institute work, and at other times he might gather and prepare for the printer valuable information on breeding, caring for and feeding the different kinds of stock After all that may be said of colleges and experiments (and I value them as highly as any one can), there is no knowledge, no instruction, that comes to the average farmer with the emphasis and force of conviction as the brief, clear cut narration of one's own experience and observation.

There is another feature of the institute work to which I wish to direct your attention. There is a growing demand for Women Institute workers, and I believe that we should ask for an appropriation for that work so as to separate that expense from the Farmers' Institute Fund. Miss Ilena Bailey has done a great work in 1910 and has often devoted her time that was much needed in other ways, and yet we were not able to fill all the calls, and many farmers' wives and daughters have been disappointed.

PUBLICATIONS.

During the year 1910 twelve copies of the monthly bulletin were issued, as follows:

Boys' Corn Growing Contests.
Home Makers' Conference.
Corn Growing in Missouri.
Ornamental Planting for the Farm Home.
Concrete on the Farm.
Report of Highway Engineers' Convention.
Revised Laws of Missouri Relating to Agriculture.
Steps in Agriculture.
Butchering Hogs on the Farm.
First Prize Five-Acre Farm Plan.
"Two Poplars"—A Five-Acre Farm Plan.
Crop Review for 1910.

So great has been the demand for these bulletins that the supply of nearly every issue has been insufficient to meet the call for them. In addition to these bulletins the board has issued a booklet, "A Billion Berries," which is one of a series of beautifully illustrated monographs.

There have also been sent out from this office many specially prepared articles on agriculture and the work of the Board, and these have been used by the metropolitan and agricultural press. Several hundred county papers have also used much press matter supplied from this office. In this connection we wish to acknowledge the Board's indebtedness to the press—local, agricultural and metropolitan, for without the work of the editor, the fieldman and all others who make up our papers—whose pages become the final forum of the people—the great agricultural awakening of today would have been impossible.

It is gratifying to note that Missouri's corn yield for the year 1910 exceeded a quarter of a billion bushels, the average yield per acre being 32.4 bushels or five bushels—or to put it in Missouri measure, one barrel—more than last year. This yield is also considerably above the 10-year average of 28.8 bushels per acre. Missouri has had a few somewhat more favorable seasons for corn growing, but what was lacking in favorable conditions was more than made up by careful seed selection and better cultivation—a result, in large measure, I believe, of Missouri's corn campaign conducted by the State Board of Agriculture and Agricultural College. It is a matter of pride to all Missourians that the State has increased her corn yield per capita from 59 bushels, in 1900, to 72.5 bushels in 1910, a gain of 13.5 bushels in a single decade.

RECOMMENDATIONS.

One of the great needs of today in Missouri is a general and uniform system for the government and control or direction of county fairs. If these very useful and important institutions are controlled by a handful of active but sometimes selfish individuals they will fail to perform their proper function. Some of our neighboring states already have organizations of county and district fairs, and are getting good results. For the purpose of organizing such association in this State a meeting was called at Sedalia during last fair week and failed of success by reason of delay in the arrival of a special train. The whole question was then postponed to this week, and the organization meeting is called for 10 o'clock tomorrow morning in the auditorium.

In this connection I also wish to speak of a bill that will come before you for consideration. It is an act designed to regulate and improve the county fairs and make them educational as they should be. It does not propose to *prohibit* county fairs being held as they have been, but by "moral 'suasion" and some small aid from the State it is hoped to bring all the county and district fairs into one family, with a uniform classification of exhibits, a uniform system of judging and the suppression of all gambling and degrading practices. Such a bill has been proposed and will be submitted to this Board for their most careful consideration.

Another bill that will probably come up for action at the present session is a pure seed law. I have taken the trouble to collect the laws now in force in the various states and have them here for your use. I respectfully suggest that a committee of three or more members be appointed to examine these laws and report to the Board during this week.

I also have a copy of a bill which I consider worthy of your careful attention, and will turn it over to your committee as soon as it is wanted. Your recommendation in this matter will have much weight in shaping public opinion and will help in the passage of the bill.

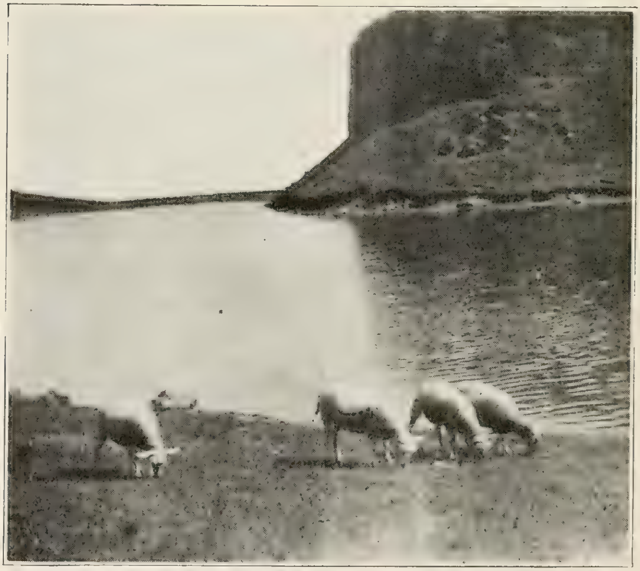
I cannot refrain from calling your attention to the inadequate appropriations for the ever-increasing demands on this Board. When called on by the State Auditor for an estimate of what would be needed in the various departments under your control and not having time to consult the Executive Committee or any members of the Committee or Board, I gave the Auditor an approximate estimate of the needs for this biennial period.

The estimate shows an increase over the last appropriation, the major part of which is in the annual report fund. This fund is entirely insufficient. We attempted to print and distribute 10,000 copies each of the 41st and 42nd reports with the $8,000.00 in this fund, and by reason of the increased cost of paper and labor.and the increase in the number of pages our funds were exhausted before the books could be distributed. The value placed on this work by the reading public is shown by the urgent appeals coming to this office for the 42nd report. While we could print but 10,000 copies with the funds given us, we have calls for over 22,000 copies now, and almost every mail brings one or more requests for the book.

Among the many bills before the last Legislature that failed of passage, I wish to mention one which provided for the collection and publication of farm statistics. It is believed that the failure of the past Legislature to provide the legal machinery for this much needed work was not due to any lack of merit in the plan, but to political or personal reasons. Be this as it may, I am impressed with the importance of this work, and the public demand for reliable statistics on farm products is such that I deem it my duty to ask your consideration of the question. In order that these several legislative questions may receive the attention their importance may justify, I respectfully suggest this question be referred to your legislative committee with power to act for the full Board. I have gathered some information on this subject of statistics that will be turned over to the committee as soon as it is needed.

As Dr. D. F. Luckey, State Veterinarian; Mr. Curtis Hill, State Highway Engineer; Dr. W. P. Cutler, State Dairy Commissioner, and Mr. M. E. Darby, State Apiary Inspector, will each submit a separate report for their respective departments, I will not give any extended notice of them here.

Respectfully submitted,
T. C. Wilson,
Secretary.



SECRETARY'S FINANCIAL STATEMENT.

To the Board of Agriculture:

I beg to submit the following exhibit of the financial transactions of the Board for the year beginning December 28, 1909, and ending January 9, 1911, which shows the balances on hand at the beginning of the year, the requisitions drawn on State Auditor, warrants drawn on W. A. Bright, treasurer of the Board, balances in the treasury of the Board, and the balances in the different funds remaining in the State Treasury:

PRINTING AND DISTRIBUTION OF ANNUAL REPORT FUND.

Date.	War. No.	Name.	Dr.	Cr.
1910.				
Jan. 27	160	By E. A. Remley		$48.00
" 27		To requisition	$100.00	
Mar. 2	161	By Pacific Express Co		6.72
" 2	162	E. A. Remley		45.28
" 30	163	Pacific Express Co		3.51
" 30	164	Newman Hdw. Co		1.30
" 30	165	E. A. Remley		10.00
" 30		To requisition	100.00	
Apr. 30	166	By Barnes-Crosby Co		5.75
" 30	167	Pacific Express Co		1.08
" 30	168	Libby & Williams Paper Co		41.25
" 30	169	E. A Remley		20.00
" 30	170	American Express Co		4.35
May 25	171	Barnes-Crosby Co		12.68
" 25	172	E. A. Remley		20.00
" 25		To requisition	100.00	
" 31	173	By Statesman Pub. Co		32.50
" 31	174	American Express Co		5.35
" 31	175	Pacific Express Co		4.05
June 30	176	E. A. Remley		8.70
July 30		To requisition	100.00	
Sept. 1	177	By E. A. Remley		100.00
" 3	178	H. L. Wilson		28.73
" 3	179	E. A. Remley		200.00
" 12	180	E. A. Remley		200.00
Oct. 1	181	By American Express Co		75.12
" 1	182	Pacific Express Co		39.34
" 4	183	H. L. Wilson		17.52
" 29		To requisition	40.33	
" 29		To warrant 1257 on Farmers' Inst. fund	490.99	
		By error		.09
			$931.32	$931.32

FARMERS' INSTITUTE FUND.

Date.	War. No.	Name.	Dr.	Cr.
1909.				
Dec. 28		To balance	$957.42	
" 29	1177	By E. A. Remley		$15.00
" 29	1178	A. J. McDowell		36.23
" 29	1179	J. C. Whitten		39.10
" 29	1180	Geo. W. Williams		22.32
" 29	1181	C. O. Raine		125.20
" 29	1182	C. A. Willson		30.72
" 29	1183	D. H. Doane		31.90
" 29	1184	W. A. Bright		20.00
" 29	1185	C. M. Long		105.59
" 29	1186	D. Ward King		10.00
" 29	1187	S. M. Jordan		190.33
" 29	1188	C. D. Lyon		183.36
" 29	1189	M. F. Miller		81.92
" 29	1190	E. A. Remley		16.00
" 29	1191	Ilena Bailey		65.43
" 29	1192	D. H. Doane		79.86
" 29	1193	Mo. Corn Growers' Assoc		190.00
" 29	1194	T. S. Gordon		2.00
" 29	1195	Edna D. Day		100.00
" 29		To requisition	1,000.00	
" 29	1196	By G. I. Christie		37.09
1910.				
Jan. 27	1197	J. N. Mitchell		8.00
" 27	1198	D. R. Scott		7.00
" 27	1199	Verne Hyde		8.50
" 27	1200	F. B. Ragsdale		7.00
" 27	1201	J. B. Rector		15.00
" 27	1202	Statesman Pub. Co		9.00
" 27	1203	W. W. Marple		47.90
" 27	1204	Barnes-Crosby Co		6.00
" 27	1205	F. H. Hillman		36.81
" 27	1206	C. B. Hutchison		7.84
" 27	1207	E. A. Remley		15.00
" 27	1208	S. M. Jordan		166.66
" 27		To requisition	500.00	
Feb. 8	1209	By R. D. Calkins		82.20
" 8	1210	C. M. Long		76.30
" 8	1211	Ilena Bailey		25.32
Mar. 2	1212	E. A. Remley		20.00
" 2	1213	E. A. Trowbridge		22.70
" 2	1214	Geo. B. Ellis		23.75
" 2	1215	C. A. Willson		24.90
" 2	1216	Allen Music Co		4.00
" 2	1217	C. B. Hutchison		9.35
" 2	1218	Curtis Hill		18.42
" 2	1219	Edna D. Day		3.52
" 2	1220	C. M. Long		156.44
" 2	1221	W. L. Howard		25.25
" 2	1222	Ilena Bailey		77.55
" 2	1223	S. M. Jordan		308.57
" 2	1224	W. H. Chandler		20.57
" 2		To requisition	500.00	
" 30	1225	By Geo. W. Williams		32.25
" 30	1226	S. M. Jordan		242.64
" 30	1227	E. A. Remley		10.00
" 30		To requisition	200.00	
Apr. 30	1228	By S. M. Jordan		217.98
" 30	1229	Geo. B. Ellis		5.55
" 30	1230	M. F. Miller		8.23
" 30	1231	Ilena Bailey		55.95
" 30	1232	E. A. Remley		10.00

FARMERS' INSTITUTE FUND—Continued.

Date.	War. No.	Name.	Dr.	Cr.
1910.				
April 30	1233	By H. E. McNatt		$13.67
" 30		To requisition	$300.00	
May 25	1234	By S. M. Jordan		199.48
" 25	1235	E. A. Remley		15.00
" 25		To requisition	300.00	
" 31	1236	By Buxton & Skinner Sta. Co		1.07
June 30	1237	S. M. Jordan		210.80
" 30	1238	H. E. McNatt		12.50
" 30		To requisition	200.00	
July 30	1239	By S. M. Jordan		170.59
" 30	1240	T. C. Wilson		3.93
" 30	1241	W. L. Nelson		29.80
" 30	1242	Statesman Pub. Co		25.00
" 30		To requisition	200.00	
Aug. 8	1243	By Columbia, Mo., Herald		12.00
" 16	1244	E. A. Remley		40.00
Sept. 1	1245	S. M. Jordan		219.70
" 1	1246	Statesman Pub. Co		12.50
" 1		To requisition	300.00	
" 3	1247	By C. B. Hutchison		10.57
Oct. 1	1248	S. M. Jordan		275.91
" 1		To requisition	500.00	
" 17	1249	By Columbia Herald		14.50
" 17	1250	C. F. Ernst		3.30
" 17	1251	T. C. Wilson		2.32
" 17	1252	Libby & Williams Paper Co		9.00
" 18	1253	J. W. Butler Paper Co		75.30
" 18	1254	E. A. Remley		300.00
" 29	1255	Columbia Tele. Co		9.10
" 29	1256	Pacific Express Co		4.05
" 29		To requisition	500.00	
" 29	1257	By distribution annual report		490.99
" 29	1258	American Express Co		6.78
" 29	1259	H. L. Wilson		35.32
" 29	1260	Columbia Herald		12.50
" 29	1261	E. A. Remley		40.00
Nov. 21	1262	J. W. Butler Paper Co		4.24
" 21	1263	American Yorkshire Club		1.00
" 21	1264	Scurlock Co		22.28
" 30	1265	E. A. Remley		40.00
" 30	1266	Columbia Tele. Co		7.80
" 30	1267	American Express Co		26.73
" 30		To requisition	700.00	
Dec. 4	1268	By Univ. Co-op. Store		6.70
" 4	1269	E. A. Remley		134.88
" 31		To requisition	591.21	
Jan. 9		By balance		1,051.12
			$6,748.63	$6,748.63

MONTHLY CROP REPORT FUND.

Date	War. No.	Name.	Dr.	Cr.
1909.				
Dec. 28		By overdraft		$26.34
" 29	551	Statesman Pub Co		3.50
" 29	552	W. A. Bright		20.00
" 29	553	R. P. Scurlock		6.01
" 29	554	E. A. Remley		15.00
" 29	555	E. A. Remley		8.00
" 29		To requisition	$100.00	
" 29	556	By E. A. Remley		4.30
1910.				
Jan. 27	557	H. O. Morarvitz		4.50
" 27	558	J. N. Mitchell		9.00
" 27	559	W. G. Shockley		4.20
" 27	560	Statesman Pub. Co		12.50
" 27	561	Libby & Williams Co		20.32
" 27	562	Scurlock Transfer Co		1.24
" 27	563	Beulah Wright		12.90
" 27	564	Smith Premier Co		2.45
" 27	565	Statesman Pub. Co		23.00
" 27	566	E. A. Remley		30.00
" 27		To requisition	200.00	
Feb. 8	567	By American Express Co		7.35
" 8	568	E. A. Remley		3.20
" 8	569	Scurlock Transfer Co		2.32
Mar. 2	570	Smith Premier Co		7.77
" 2	571	F. M. Ludwick		17.25
" 2	572	J. W. Butler Paper Co		11.96
" 2	573	E. S. Remley		15.00
" 2	574	Barnes-Crosby Co		30.57
" 2	575	Pacific Express Co		3.83
" 2	576	Scurlock Transfer Co		1.31
" 2		To requisition	100.00	
" 2	577	By Scurlock Transfer Co		1.92
" 2	578	E. A. Remley		2.35
" 2	579	American Express Co		8.76
" 21	580	E. A. Remley		30.00
" 30	581	The Fruit Grower		30.00
" 30	582	Barnes-Crosby Co		9.42
" 30	583	E. A. Remley		40.00
" 30	584	Statesman Pub. Co		3.00
" 30	585	E. W. Stephens Pub. Co		13.00
" 30		To requisition	100.00	
" 30	586	By American Express Co		.70
Apr. 20	587	E. A. Remley		30.00
" 30	588	E. A. Remley		35.00
" 30		To requisition	100.00	
May 25	589	By Barnes-Crosby Co		74.16
" 25	590	E. A. Remley		5.85
" 25	591	Scurlock Transfer Co		8.41
" 25	592	E. A. Remley		40.00
" 25		To Requisition	100.00	
" 21	593	By Statesman Pub. Co		47.25
Sept. 3	594	E. A. Remley		5.90
" 3	595	Columbia Herald		3.50
Oct. 1	596	E. A. Remley		11.75
" 1		To requisition	100.00	
" 17	597	By Columbia Herald		3.50
" 29		To requisition	20.41	
" 29	598	By E. A. Remley		30.00
Nov. 21	599	Smith Premier Co		15.25
Jan. 9		By balance		66.87
			$820.41	$820.41

STATE HIGHWAY ENGINEER FUND.

Date	War. No.	Name.	Dr.	Cr.
1909.				
Dec. 28		To balance	$540.53	
“ 29	219	By F J. Kersting		$173.50
“ 29	220	J. S. Craigo		12.00
“ 29	221	W. A. Bright		20.00
“ 29	222	L. Ruckert		2.03
“ 29	223	Etta Gilbert		25.00
“ 29	224	Curtis Hill		276.23
“ 29	225	Kueffel & Esser Co		27.65
“ 29	226	L. V. Davis		23.50
“ 29	227	E. A. Remley		16.00
“ 29	228	E. A. Remley		15.00
“ 29		To requisition	500.00	
Jan. 27	229	By Statesman Pub Co		36.50
“ 27	230	Etta Gilbert		25.00
“ 27	231	L. Ruckert & Co		3.98
“ 27	232	Troxell Robinson Co		13.50
“ 27	233	Columbia Herald		108.75
“ 27	234	Curtis Hill		222.05
“ 27	235	F. J. Kersting		178.90
“ 27	236	Columbia Tele. Co		1.90
“ 27	237	E. A. Remley		15.00
“ 27		To requisition	500.00	
Mar. 2	238	By Etta Gilbert		25.00
“ 2	239	E. A. Remley		15.00
“ 2	240	F. J. Kersting		237.12
“ 2	241	Curtis Hill		295.33
“ 2	242	W. H. Pike		32.50
“ 2	243	Missouri Bridge & Iron Co		4.80
“ 2	244	L. Ruckert & Co		3.84
“ 2	245	Columbia Tele. Co		3.00
“ 2	246	Statesman Pub. Co		10.00
“ 2		To requisition	500.00	
“ 30	247	By Curtis Hill		273.30
“ 30	248	F. J. Kersting		196.90
“ 30	249	Columbia Tele. Co		1.25
“ 30	250	Etta Gilbert		25.00
“ 30	251	L. Ruckert & Co		.81
“ 30	252	E. A. Remley		15.00
“ 30		To requisition	800.00	
Apr. 30	253	By Columbia Tele. Co		1.90
“ 30	254	Curtis Hill		221.94
“ 30	255	F. J. Kersting		150.60
“ 30	256	Etta Gilbert		25.00
“ 30	257	L. Ruckert & Co		13.58
“ 30		To requisition	300.00	
May 3	258	By Western Paper Box Co		13.25
“ 25	259	Curtis Hill		233.67
“ 25	260	L. Ruckert & Co		1.37
“ 25	261	E. A. Remley		15.00
“ 25	262	F. J Kersting		196.90
“ 25	263	Etta Gilbert		25.00
“ 25		To requisition	400.00	
“ 28	264	By L. Ruckert & Co		3.22
“ 28	265	Barnes-Crosby Co		7.50
	266	Canceled.		
“ 31	267	Statesman Pub. Co		54.50
“ 31	268	Columbia Tele. Co		1.25
June 30	269	Curtis Hill		252.01
“ 30	270	F. J. Kersting		181.80
“ 30	271	L. Ruckert & Co		7.21
“ 30	272	Barnes-Crosby Co		8.30
“ 30	273	Vallye Boyce		25.00

STATE HIGHWAY ENGINEER FUND—Continued.

Date.	War. No.	Name.	Dr.	Cr.
Jan. 30	274	By Columbia Tele. Co		$3.20
" 30	275	Scurlock Transfer Co		10.17
" 30		To requisition	$500.00	
July 30	276	By Curtis Hill		255.11
" 30	277	F. J. Kersting		174.57
" 30	278	Vallye Boyce		25.00
" 30	279	L. Ruckert & Co		10.88
" 30	280	Smith Premier Co		6.41
" 30	281	R. F. Rogers		1.20
" 30	282	E. A. Remley		15.00
" 30		To requisition	500.00	
Aug. 8	283	By Scurlock Transfer Co		1.85
" 8	284	Columbia Tele. Co		2.25
Sept. 1	285	Curtis Hill		267.31
" 1	286	Vallye Boyce		7.75
" 1	287	Pacific Express Co		5.15
" 1	288	L. Ruckert & Co		13.25
" 1	289	Mo. Bridge & Iron Co		3.50
" 1	290	F. J. Kersting		166.15
" 1		To requisition	500.00	
" 1	291	By E. A. Remley		15.00
Oct. 1	292	Curtis Hill		386.03
" 1	293	Columbia Tele. Co		8.25
" 1		To requisition	500.00	
" 4	294	By Statesman Pub. Co		31.00
" 4	295	F. J. Kersting		207.05
" 29	296	Curtis Hill		350.50
" 29	297	F. J. Kersting		156.02
" 29	298	L. Ruckert & Co		8.22
" 29		To requisition	600.00	
Nov. 30	299	By Curtis Hill		263.67
" 30	300	F. J. Kersting		150.85
" 30	301	L. Ruckert & Co		3.75
		By error warrant 284		.60
" 30		To requisition	331.45	
Jan. 9		By balance		148.15
			$6,471.98	$6,471.98

STATE VETERINARY FUND.

Date.	War. No.	Name.	Dr.	Cr.
1909.				
Dec. 28		By overdraft		$100.65
" 29	2372	J. S. Craigo		6.00
" 29	2373	Horace Bradley		4.00
" 29	2374	W. A. Bright		30.00
" 29	2375	L. D. Brown		168.90
" 29	2376	W. A. Norman		107.20
" 29	2377	D. F. Luckey		185.31
" 29	2378	E. A. Remley		15.00
" 29	2379	J. H. Slater		18.43
" 29	2380	J. E. Taylor		95.40
" 29		To requisition	$1,200.00	
" 29	2381	By R. C. Moore		45.50
" 29	2382	R. L. Hill		37.05
" 29	2383	L. S. Backus		12.15
1910.				
Jan. 27	2384	Univ. Co-op. Store		3.00

STATE VETERINARY FUND—Continued.

Date.	War. No.	Name.	Dr.	Cr.
1910.				
Jan. 27	2385	By A. J. Hammerstein		$5.00
" 27	2386	Statesman Pub. Co		3.50
" 27	2387	H. C. Tuck		188.77
" 27	2388	J. H. McElroy		7.50
" 27	2389	James Cullison		8.00
" 27	2390	H. H. Wolf		8.50
" 27	2391	D. F. Luckey		166.62
" 27	2392	Columbia Tele. Co		1.95
" 27	2393	F. M. Ludwick		33.30
" 27	2394	E. A. Remley		16.00
" 27	2395	R. L. Hill		29.25
" 27	2396	E. A. Remley		15.00
" 27		To requisition	$800.00	
Feb. 8	2397	By L. D. Brown		168.37
Mar. 2	2398	Jas. Cullison		17.48
" 2	2399	R. C. Moore		68.00
" 2	2400	J. H. Slater		8.69
" 2	2401	Statesman Pub. Co		4.00
" 2	2402	E. A. Remley		15.00
" 2	2403	R. L. Hill		52.05
" 2	2404	H. C. Tuck		377.72
" 2	2405	D. F. Luckey		186.50
" 2	2406	Columbia Tele. Co		3.05
" 2	2407	R. C. Moore		71.00
" 2	2408	F. W. O'Brien		14.60
" 2	2409	L. D. Brown		160.90
" 2	2410	Stanley Smith		17.68
" 2		To requisition	1,000.00	
" 2	2411	By W. A. Dallmeyer		15.54
" 2	2412	J. W. Boles		11.85
" 2	2413	A. T. Nelson		26.65
" 2	2414	W. A. Dallmeyer		7.00
" 2	2415	T. C. Wilson		5.96
" 2	2416	F. B. Mumford		6.46
" 26	2417	E. A. Remley		20.00
" 30	2418	D. F. Luckey		164.32
" 30	2419	W. C. Hutchison		18.11
" 30	2420	Columbia Tele. Co		2.45
" 30	2421	T. C. Wilson		7.23
" 30	2422	E. A. Remley		30.00
" 30	2423	Statesman Pub. Co		16.50
" 30	2424	E. W. Stephens Pub. Co		24.00
" 30	2425	R. L. Hill		35.34
" 30		To requisition	1,000.00	
Apr. 30	2426	By A. J. Hammerstein		7.50
" 30	2427	Columbia Tele. Co		1.25
" 30	2428	Jas. Cullison		7.56
" 30	2429	H. H. Wolf		5.55
" 30	2430	L. D. Brown		158.40
" 30	2431	H. C. Tuck		182.43
" 30	2432	M. V. O'Brien		21.79
" 30	2433	W. D. Welch		14.27
" 30	2434	C. N. Scott		8.08
" 30	2435	Frank S. Betz & Co		16.00
" 30	2436	R. C. Moore		42.50
" 30	2437	E. A. Remley		40.00
" 30	2438	By E. W. Stephens Pub. Co		6.00
" 30	2439	D. F. Luckey		178.86
" 30		To requisition	200.00	
May 3	2440	By R. L. Hill		36.57
" 3	2441	R. C. Moore		25.00
" 3	2442	H. C. Tuck		166.07

STATE VETERINARY FUND—Continued.

Date.		War. No.	Name.	Dr.	Cr.
1910.					
"	3	2443	By L. D. Brown		$168.03
"	25	2444	R. B. Love		21.75
"	25	2445	M. Easley		95.79
"	25	2446	A. J. Hammerstein		13.10
"	25	2447	E. A. Remley		40.00
"	25	2448	D. F. Luckey		162.05
"	25		To requisition	$600.00	
"	26	2449	By E. W. Stephens Pub. Co		30.00
"	28	2450	R. L. Hill		26.55
"	28	2451	R. C. Moore		55.00
"	31	2452	H. C. Tuck		208.14
"	31	2453	L. D. Brown		186.99
"	31	2454	Statesman Pub. Co		44.50
"	31	2455	Penn's Pharmacy		62.37
"	31	2456	Columbia Tele. Co		2.00
June	1	2457	Western Union Tele. Co		5.07
"	30	2458	D. F. Luckey		233.50
"	30	2459	R. L. Hill		31.21
"	30	2460	A. J. Hammerstein		17.00
"	30	2461	Smith Premier Co		16.00
"	30	2462	Buxton & Skinner Sta. Co		5.00
"	30	2463	American Express Co		2.65
"	30	2464	Columbia Herald		44.75
"	30	2465	H. C. Tuck		231.95
"	30	2466	Pacific Express Co		3.49
"	30	2467	R. C. Moore		98.15
"	30		To requisition	1,500.00	
July	6	2468	By A. J. Hammerstein		5.00
"	6	2469	E. W. Stephens Pub. Co		8.40
"	6	2470	Western Union Tele. Co		2.36
"	6	2471	L. D. Brown		229.10
"	30	2472	D. F. Luckey		214.65
"	30	2473	H. C. Tuck		251.25
"	30	2474	R. C. Moore		27.50
"	30	2475	G. E. White		6.18
"	30	2476	M. E. Easley		48.41
"	30	2477	Pacific Express		2.00
"	30	2478	E. A. Remley		25.00
"	30		To requisition	1,000.00	
"	30	2479	By R. L. Hill		27.64
Aug.	8	2480	L. D. Brown		229.75
"	8	2481	Western Union Tele. Co		1.46
"	8	2482	Columbia Tele. Co		1.95
"	8	2483	A. J. Hammerstein		28.70
Sept.	1	2484	H. C. Tuck		220.95
"	1	2485	L. D. Brown		227.99
"	1	2486	L. G. Clark		20.20
"	1	2487	Horace Bradley		7.62
"	1	2488	Stanley Smith		17.45
"	1	2489	M. Easley		79.08
"	1	2490	Western Union Tele. Co		3.31
"	1	2491	Columbia Tele. Co		8.65
"	1	2492	D. F. Luckey		257.28
"	1	2493	R. L. Hill		41.65
"	1		To requisition	1,000.00	
"	1	2494	By E. A. Remley		20.00
"	3	2495	R. C. Moore		92.50
Oct.	1	2496	D. F. Luckey		190.06
"	1	2497	Ed. Moore		35.25
"	1	2498	F. W. O'Brien		15.55
"	1	2499	M. Easley		45.11
"	1	2500	Henry Heil Chemical Co		22.80

STATE VETERINARY FUND—Continued.

Date.	War. No.	Name.	Dr.	Cr.
1910.				
Oct. 1	2501	By Smith Premier Twp. Co		$16.98
" 1		To requisition	$1,000.00	
" 4	2502	By Western Union Tele. Co		4.72
" 4	2503	James Cullison		8.55
" 4	2504	Ed. Moore		112.10
" 4	2505	R. L. Hill		50.00
" 4	2506	R. B. Love		63.25
" 4	2507	H. F. Boettner		13.50
" 4	2508	H. C. Tuck		242.15
" 4	2509	A. J. Hammerstein		5.00
" 4	2510	L. D. Brown		226.65
" 17	2511	R. C. Moore		70.40
" 18	2512	T. C. Wilson		5.10
" 18	2513	A. T. Nelson		26.95
" 18	2514	C. N. Scott		9.00
" 18	2515	F. B. Mumford		3.60
" 29	2516	D. F. Luckey		196.56
" 29	2517	R. C. Moore		65.00
" 29	2518	R. L. Hill		32.88
" 29	2519	T. E. White		7.45
" 29	2520	W. C. Hutchison		18.60
" 29	2521	A. J. Hammerstein		20.60
" 29	2522	R. J. Mitchell		4.00
" 29	2523	Western Union Tele. Co		5.86
" 29		To requisition	1,000.00	
" 29	2524	By H. V. Goode		7.30
" 29	2524	M. Easley		45.81
" 29	2526	J. H. McElroy		16.50
" 29	2527	H. C. Tuck		214.45
" 29	2528	Ed Moore		111.00
" 29	2529	L. D. Brown		231.20
Nov. 21	2530	L. G. Clark		9.65
" 21	2531	James Cullison		11.39
" 21	2532	H. V. Goode		11.00
" 21	2533	A. J. Hammerstein		29.25
" 21	2534	Smith Premier Twp. Co		3.50
" 30	2535	D. F. Luckey		178.87
" 30	2536	F. S. Betz Co		16.00
" 30	2537	M. Easley		45.83
" 30	2538	H. C. Ward		126.90
" 30	2539	Western Union Tele. Co		9.80
" 30	2540	James Cullison		15.50
" 30	2541	Ed. Moore		109.00
" 30	2542	R. L. Hill		42.07
" 30		To requisition	1,200.00	
Dec. 4	2543	By A. J. Hammerstein		21.10
" 4	2544	R. C. Moore		50.50
" 4	2545	H. C. Tuck		229.35
" 4	2546	L. D. Brown		238.55
" 17	2547	E. A. Remley		40.00
" 31		To requisition	1,600.00	
Jan. 9		By balance		2,070.48
			$13,100.00	$13,100.00

OFFICE EXPENSE FUND.

Date.	War. No.	Name.	Dr.	Cr.
1909.				
Dec. 28		To balance	$56.11	
“ 29	784	By J. S. Craigo		$17.00
“ 29	785	Smith Premier Co		5.21
“ 29	786	W. A. Bright		10.00
“ 29	787	Mike Sevier		1.00
“ 29	788	W. E. Harshe		9.25
“ 29	789	Troxell-Robinson Co		61.88
“ 29	790	M. C. Lilley & Co		8.10
“ 29	791	B. H. Ozment		25.00
“ 29		To requisition	100.00	
“ 29	792	By American Express Co		7.42
1910.				
Jan. 27	793	Scurlock Transfer Co		1.50
“ 27	794	Newman Hdw. Co		15.50
“ 27	795	L. V. Davis		20.45
“ 27	796	Columbia Tele. Co		6.65
“ 27	797	Pacific Express Co		1.00
“ 27	798	Statesman Pub. Co		16.00
“ 27	799	Pacific Express Co		19.42
“ 27		To requisition	100.00	
Feb. 8	800	By Pacific Express Co		9.51
Mar. 2	801	D. N. Wetherell		15.00
“ 2	802	E. A. Remley		20.00
“ 2	803	W. E. Harshe		3.45
“ 2	804	L. V. Davis		32.75
“ 2	805	Kampmeyer & Wagner		2.60
“ 2	806	Columbia Tele. Co		8.85
“ 2	807	Statesman Pub. Co		30.00
“ 2	808	Mrs. E. M. Marten		2.00
“ 2		To requisition	200.00	
“ 30	809	By John L. Douglas		15.00
“ 30	810	Chas. Matthews Hdw. Co		1.50
“ 30	811	Smith Premier Co		3.50
“ 30	812	Troxell-Robinson Furn. Co		3.50
“ 30	813	W. E. Harshe		1.30
“ 30	814	Columbia Tele. Co		3.90
“ 30	815	L. V. Davis		23.02
“ 30	816	Chas. E. Maupin		12.50
“ 30		To requisition	100.00	
Apr. 30	817	By Columbia Tele. Co		3.00
“ 30	818	W. E. Harshe		3.95
“ 30	819	Co-operative Store		6.30
“ 30	820	Smith Premier Co		19.71
“ 30	821	D. N. Wetherell		15.00
“ 30	822	L. V. Davis		19.50
“ 30	823	C. E. Maupin		12.50
May 25	824	Smith Premier Co		43.07
“ 25	825	W. E. Harshe		4.25
“ 25	826	Co-operative Store		3.00
“ 25	827	Buxton & Skinner Co		1.60
“ 25	828	C. E. Maupin		12.50
“ 26	829	Smith Premier Co		8.02
“ 31	830	Columbia Tele. Co		3.00
June 30	831	Columbia Tele. Co		3.25
“ 30		To requisition	50.00	
“ 30	832	By J. W. Comer		5.00
July 30	833	American Express Co		1.00
Aug. 8	834	Columbia Tele. Co		3.00
Sept. 1	835	Newman Hdw. Co		1.50

OFFICE EXPENSE FUND—Continued.

Date.	War. No.	Name.	Dr.	Cr.
1910				
Oct. 17	836	By Smith Premier Co		$2.00
" 29		To requisition	$50.00	
" 29	837	By St. Louis Printers Supply Co		39.69
Nov. 21	838	Scurlock Co.		4.51
1911.				
Jan. 9		By balance		27.00
			$656.11	$656.11

EXPENSE OF MEMBERS FUND.

Date.	War. No.	Name.	Dr.	Cr.
1909.				
Dec. 28		To balance	$248.49	
" 29	786	By W. R. Wilkinson		$15.00
" 29	787	S. Mc Smith		21.80
" 29	788	J. W. Boles		14.40
" 29	789	W. C. Hutchison		20.60
" 29	790	N. H. Gentry		8.65
" 29	791	Geo. H. Sly		22.20
" 29	792	E. L. Newlon		20.40
" 29	793	M. B. Greensfelder		17.40
" 29	794	A. T. Nelson		34.90
" 29	795	R. A. Young		40.10
1910.				
Jan. 27		To requisition	250.00	
" 27	796	By W. A. Dallmeyer		9.90
" 27	797	H. A. Gass		3.05
Feb. 8	798	E. L. Newlon		32.53
" 8	799	A. M. Thompson		31.90
" 8	800	F. B. Mumford		21.10
" 8	801	S. Mc. Smith		23.80
Mar. 2	802	J. W. Boles		25.90
" 2	803	Hotel Gordon		2.00
" 2	804	Geo. B. Ellis		20.49
" 2		To requisition	200.00	
" 2	805	By Geo. B. Ellis		6.70
" 2	806	Geo. H. Sly		23.55
" 2	807	W. C. Hutchison		24.60
" 2	808	W. A. Dallmeyer		20.00
" 2	809	Norman J. Colman		20.00
" 2	810	R. A. Young		12.50
" 2	811	A. T. Nelson		11.00
Apr. 30	812	T. C. Wilson		2.29
June 11	813	W. C. Hutchison		21.73
" 11	814	J. W. Boles		11.34
" 11	815	A. T. Nelson		44.35
" 11	816	T. C. Wilson		11.00
Oct. 1		To requisition	250.00	
" 4	817	By Statesman Pub. Co		30.00
" 17	818	A. T. Nelson		38.70
" 17	819	T. C. Wilson		25.85
1911.				
Jan. 9		By balance		258.76
			$948.49	$948.49

APIARY INSPECTION FUND.

Date.	War. No.	Name.	Dr.	Cr.
1909.				
Dec. 28		To balance	$88.85	
" 29	20	By M. E. Darby		$88.85
Mar. 2	21	M. E. Darby		65.60
" 2		To requisition	250.00	
" 30	22	By M. E. Darby		61.05
May 3	23	M. E. Darby		134.10
" 25		To requisition	200.00	
" 25	24	By M. E. Darby		121.95
June 30		To requisition	100.00	
July 30	25	By M. E. Darby		131.70
" 30	26	M. E. Darby		120.69
" 30		To requisition	200.00	
Sept. 1	27	By M. E. Darby		170.48
" 1		To requisition	200.00	
Oct. 17	28	By M. E. Darby		121.73
" 29	29	M. E. Darby		22.70
Nov. 30		To requisition	50.00	
Jan. 9		By balance		50.00
			$1,088.85	$1,088.85

EXTENSION COURSE IN AGRICULTURAL FUND.

Date.	War. No.	Name.	Dr.	Cr.
1910.				
Sept. 1		To requisition	$500.00	
" 17	1	By C. M. Long		$35.04
" 17	2	E. A. Remley		40.00
" 26	3	C. M. Long		84.76
Oct. 1	4	Ilena Bailey		18.68
" 1	5	Geo. W. Williams		63.67
" 1	6	Nat. Railway Pub. Co		1.00
" 1	7	L. Ruckert & Co		5.50
" 1	8	Barnes-Crosby Co		2.50
" 1		To requisition	1,000.00	
" 4	9	By N. D. Robnett		1.00
" 4	10	C. O. Raine		28.55
" 11	11	A. J. McDowell		72.30
" 18	12	E. A. Remley		40.00
" 18	13	Ilena Bailey		36.32
" 29	14	Ilena Bailey		27.20
" 29	15	C. M. Long		59.71
" 29	16	W. L. Nelson		10.00
" 29	17	J. C. Whitten		6.55
" 29	18	T. R. Douglass		60.14
" 29	19	F. J. Kersting		15.56
" 29	20	C. O. Raine		29.47
" 29	21	H. O. Allison		16.11
" 29	22	F. H. Demaree		26.00
" 29	23	J. C. Hackleman		36.20
" 29	24	Smith Premier Co		32.30
" 29		To requisition	500.00	
" 29	25	By R. D. Calkins		60.26
" 29	26	J. C. Hackleman		18.49
" 29	27	S. M. Jordan		265.20
" 29	28	C. M. Long		15.00
" 29	29	J. C. Whitten		9.61
Nov. 15	30	Ilena Bailey		91.08
" 21	31	W. L. Nelson		12.58

EXTENSION COURSE IN AGRICULTURAL FUND—Continued.

Date.	War. No.	Name.	Dr.	Cr.
1910				
Nov. 21....	32	By A. J. McDowell.	....	$21.65
" 21....	33	Geo. W. Williams...........	....	112.36
" 21....	34	W. H. Chandler...........	....	16.80
" 21....	35	C. O. Raine...........	....	14.49
" 21....	36	C. B. Hutchison...........	....	37.64
" 21....	37	R. D. Calkins...........	....	35.01
" 21....	38	C. M. Long...........	....	69.45
" 21....	39	O. R. Johnson...........	....	16.23
" 21....	40	Louise Stanley...........	....	12.00
" 21....	41	D. H. Doane...........	....	13.16
" 30....	42	R. D. Calkins...........	....	84.83
" 30....	43	Curtis Hill...........	....	12.20
" 30....	44	Geo. Williams...........	....	54.13
" 30....	45	Ilena Bailey...........	....	31.80
" 30....	46	T. C. Wilson...........	....	11.20
" 30....	47	Charley Tidd...........	....	10.03
" 30....	48	H. E. McNatt...........	....	22.87
" 30....	49	J. J. Stogdale...........	....	11.75
" 30....	50	C. H. Eckles...........	....	17.95
" 30....	51	C. B. Hutchison...........	....	49.36
" 30....	....	To requisition......	$1,000.00	
Dec. 4....	52	By Geo. Williams...........	....	70.55
" 4....	53	J. C. Whitten...........	....	14.80
" 4....	54	S. M. Jordan...........	....	258.54
" 4....	55	Geo. Jordan...........	....	130.51
" 4....	56	Pacific Express Co...........	....	99.52
" 17....	57	H. E. McNatt...........	....	16.20
" 17....	58	T. E. Woodward...........	....	23.08
" 17....	59	Ilena Bailey...........	....	23.57
" 17....	60	J. C. Hackleman...........	....	9.35
" 17....	61	E. A. Trowbridge...........	....	10.11
" 17....	62	A. J. Meyer...........	....	13.60
" 17....	63	R. D. Calkins...........	....	44.20
" 17....	64	C. M. Long...........	....	80.61
" 17....	65	T. C. Wilson...........	....	3.00
Jan. 9....	....	By balance...........	....	326.67
			$3,000.00	$3,000.00

SUMMARY OF SECRETARY'S FINANCIAL STATEMENT.

EXPENSE OF MEMBERS FUND.

Date.		Dr.	Cr.
Dec. 28, 1909.....	To balance in State Treasury..........	$700.00	
Dec. 28, 1909......	To balance in treasury Board of Agriculture........................	248.49	
Dec. 28, 1909 to Jan. 9, 1911...........	By warrants drawn on treasurer Board of Agriculture...............	....	$689.73
Jan. 9, 1911.......	By balance treasury Board of Agriculture.	....	258.76
		$948.49	$948.49

MONTHLY CROP REPORT FUND.

Date.		Dr	Cr.
Dec. 28, 1909	To balance in State Treasury	$1,302.20	
Dec. 28, 1909	By overdraft treasurer Board of Agriculture		$26.34
Dec. 28, 1909, to Jan 9, 1911	By warrants drawn on treasurer Board of Agriculture		727.20
Jan. 9, 1911	By balance treasury Board of Agriculture		66.87
	By amounts paid for printing bulletins, account with printing commission		481.79
		$1,302.20	$1,302.20

FARMERS' INSTITUTE FUND.

Date.		Dr.	Cr.
Dec. 28, 1909	To balance in State treasury	$6,356.59	
Dec. 28, 1909	To balance treasury Board of Agriculture	957.42	
Dec. 28, 1909, to Jan. 9, 1911	By warrants drawn on treasurer Board of Agriculture		$5,697.51
	By amounts paid for printing bulletins, account with printing commission		565.38
Jan. 9, 1911	By balance treasury Board of Agriculture		1,051.12
		$7,314.01	$7,314.01

OFFICE EXPENSE FUND.

Date.		Dr.	Cr.
Dec. 28, 1909	To balance State Treasury	$600.00	
Dec. 28, 1909	To balance treasury Board of Agriculture	56.11	
Dec. 28, 1909, to Jan. 9, 1911	By warrants drawn on treasurer Board of Agriculture		$629.11
Jan. 9, 1911	By balance treasury Board of Agriculture		27.00
		$656.11	$656.11

STATE VETERINARY FUND.

Date.		Dr.	Cr.
Dec. 28, 1909	To balance State Treasury	$13,200.00	
Dec. 28, 1909	By overdraft treasurer Board of Agriculture		$100.65
Dec. 28, 1909, to Jan 9, 1911	By warrants drawn on treasurer Board of Agriculture		10,928.87
Jan. 9, 1911	By balance treasury Board of Agriculture		2,070.48
Jan. 9, 1911	By balance State Treasury		100.00
		$13,200.00	$13,200.00

STATE HIGHWAY ENGINEER FUND.

Date.		Dr.	Cr.
Dec 21, 1909	To balance State Treasury	$6,220.88	
Dec. 28, 1909	To balance treasury Board of Agriculture	540.53	
Dec. 28, 1909, to Jan. 9, 1911	By warrants drawn on treasurer Board of Agriculture		$6,323.83
Jan. 9, 1911	By balance treasury Board of Agriculture		148.15
	By amounts paid for printing bulletins, account with printing commission		289.43
		$6,761.41	$6,761.41

APIARY INSPECTION FUND.

Date.		Dr.	Cr.
Dec. 28, 1909	To balance State Treasury	$1,000.00	
Dec. 28, 1909	To balance treasury Board of Agriculture	88.85	
Dec. 28, 1909, to Jan 9, 1911	By warrants drawn on treasurer Board of Agriculture		$1,038.85
Jan. 9, 1911	By balance treasury Board of Agriculture		50.00
		$1,088.85	$1,088.85

PRINTING AND DISTRIBUTION OF ANNUAL REPORT FUND.

Date.		Dr.	Cr.
Dec. 28, 1909	To balance in State Treasury	$4,112.91	
Oct. 29, 1910	To warrant 1257 on Farmers' Inst. Fund	490.99	
Dec. 28, 1909, to Jan 9, 1911	By warrants drawn on treasurer Board of Agriculture		$931.23
	By error		.09
	By amount paid for printing and binding 42nd Annual Report, account with printing commission		3,672.58
		$4,603.90	$4,603.90

EXTENSION COURSE IN AGRICULTURAL FUND.

Date.		Dr.	Cr.
Sept. 1	To appropriation	$3,000.00	
Sept. 1, 1910, to Jan. 9, 1911	By warrants drawn on Treasurer Board of Agriculture		$2,673.33
Jan. 9, 1911	By balance treasury Board of Agriculture		326.67
		$3,000.00	$3,000.00

TREASURER'S REPORT.

To the State Board of Agriculture:

I, W. A. Bright, Treasurer of the Board of Agriculture, submit the following report of the money received from last report and from the State Treasurer, including balances, and the amounts paid out on warrants presented against the several funds of the Board of Agriculture, and the balances now on hand, January 11, 1911.

PRINTING OF ANNUAL REPORT.

Date.		Dr.	Cr.
Mar. 22, 1910	By overdraft		$.09
Apr. 7, 1910	To State Warrant	$100.00	
June 2, 1910	To State Warrant	100.00	
Aug 6, 1910	To State Warrant	100.00	
Nov. 6, 1910	To State Warrant	40.33	
Nov. 16, 1910	To Farmers Institute	490.99	
Jan. 9, 1911	By warrants paid and cancelled		831.23
		$831.32	$831.32

MONTHLY CROP REPORT.

Date.		Dr.	Cr.
Mar. 22, 1910	To balance	$83.17	
Apr. 7, 1910	To State Warrant	100.00	
May 12, 1910	To State Warrant	100.00	
June 2, 1910	To State Warrant	100.00	
Oct. 12, 1910	To State Warrant	100.00	
Nov. 9, 1910	To State Warrant	20.41	
Jan. 9, 1911	By Warrants paid and cancelled		$436 69
Jan. 9, 1911	By balance		66.89
		$503.58	$503.58

EXPENSE OF MEMBERS.

Date.		Dr.	Cr.
Mar. 22, 1910	To balances	$206.53	
Oct. 12, 1910	To State Warrant	250.00	
Jan. 9, 1911	By Warrants paid and cancelled		$197.76
Jan. 9, 1911	By balance		258.77
		$456.53	$456.53

FARMERS' INSTITUTE.

Date.		Dr.	Cr.
Mar. 22, 1910	To balance	$354.70	
Apr. 7, 1910	To State Warrant	200.00	
May 12, 1910	To State Warrant	300.00	
June 2, 1910	To State Warrant	300.00	
July 7, 1910	To State Warrant	200.00	
Aug. 6, 1910	To State Warrant	200.00	
Sept. 7, 1910	To State Warrant	300.00	
Oct. 12, 1910	To State Warrant	500.00	
Nov. 4, 1910	To State Warrant	500.00	
Dec. 8, 1910	To State Warrant	700.00	
Jan. 9, 1911	By Warrants paid and cancelled		$3,094.78
Jan. 9, 1911	By balance		1,051.13
Jan. 11, 1911	To State Warrant	591.21	
		$4,145.91	$4,145.91

OFFICE EXPENSES.

Date.		Dr.	Cr.
Mar. 22, 1910	To balance	$106.58	
Apr. 7, 1910	To State Warrant	100.00	
July 7, 1910	To State Warrant	50.00	
Nov. 4, 1910	To State Warrant	50.00	
Jan. 9, 1911	By Warrants paid and cancelled		$279.57
Jan. 9, 1911	By balance		27.01
		$306.58	$306.58

STATE VETERINARY FUND.

Date.		Dr.	Cr.
Mar. 22, 1910	To balance	$476.18	
Apr. 7, 1910	To State Warrant	1,000.00	
May 12, 1910	To State Warrant	200.00	
June 2, 1910	To State Warrant	600.00	
July 7, 1910	To State Warrant	1,500.00	
Aug. 6, 1910	To State Warrant	1,000.00	
Sept. 7, 1910	To State Warrant	1,000.00	
Oct. 12, 1910	To State Warrant	1,000.00	
Nov. 4, 1910	To State Warrant	1,000.00	
Dec. 8, 1910	To State Warrant	1,200.00	
Jan. 9, 1911	By Warrants paid and cancelled		$8,5 5.69
Jan. 9, 1911	By balance		2,070.49
Jan. 11, 1911	By State Warrant	1,600.00	
		$10,576.18	$10,576.18

INSPECTION OF APIARIES.

Date.		Dr.	Cr.
Mar. 22, 1910	To balance	$184.40	
June 2, 1910	To State Warrant	200.00	
July 7, 1910	To State Warrant	100.00	
Aug. 6, 1910	To State Warrant	200.00	
Sept. 7, 1910	To State Warrant	200.00	
Dec. 8, 1910	To State Warrant	50.00	
Jan. 9, 1911	By Warrants paid and cancelled		$884.40
Jan. 9, 1911	By balance		50.00
		$934.40	$934.40

STATE HIGHWAY ENGINEER.

Date.		Dr.	Cr.
Mar. 22, 1910	To balance	$217.46	
Apr. 7, 1910	To State Warrant	800.00	
May 12, 1910	To State Warrant	300.00	
June 2, 1910	To State Warrant	400.00	
July 7, 1910	To State Warrant	500.00	
Aug. 6, 1910	To State Warrant	500.00	
Sept. 13 ,1910	To State Warrant	500.00	
Oct. 12, 1910	To State Warrant	500.00	
Nov. 4, 1910	To State Warrant	600.00	
Dec. 8, 1910	To State Warrant	331.45	
Jan. 9, 1911	By warrants paid and cancelled		$4,500.75
Jan. 9, 1911	By balance		148.16
		$4,648.91	$4;648.91

EXTENSION COURSE.

Date.		Dr.	Cr.
Sept. 7, 1910	To State Warrant	$500.00	
Oct. 12, 1910	To State Warrant	1,000.00	
Nov. 4, 1910	To State Warrant	500.00	
Dec. 8, 1910	To State Warrant	1,000.00	
Jan. 9, 1911	By Warrants paid and cancelled		$2,606.05
Jan. 9, 1911	By balance		393.95
		$3,000.00	$3,000.00

Respectfully submitted,
W. A. Bright,
Treasurer.

REPORT OF STATE HIGHWAY ENGINEER.

Columbia, Mo., December 31, 1910.

To the State Board of Agriculture:

Gentlemen—In view of the fact that this is my fourth annual report, my term of office expiring within a few months, I shall take the liberty to make a general summary of the work and policies during my tenure of office.

Summary of Work—Beginning with July 6, 1907, and ending December 31, 1910, the State Highway Engineer's office has responded by sending a representative to 420 separate calls throughout the State upon road affairs; made field surveys, plans and estimates for 109 miles of road at an estimated cost of $200,000; designed 162 concrete bridges having a total length of 2,080 feet at an estimated cost of $109,820, and 126 steel bridges with a total length of 10,067 feet, at an estimated cost of $236,950. A total estimated cost of work upon plans made by the office of $546,770. Eleven bulletins and several circulars upon road and bridge work have been issued. All this does not include the numerous inquiries which have been answered and consultations given by mail. Much of the work is of such a nature that its value cannot be estimated in dollars and cents nor take into account the far-reaching effect which the road meetings, publications and other similar efforts may have. Neither has it been the aim to cheapen the work, but rather to get good road work at its true value.

Assistance Where Asked—The office has given assistance in road affairs to any reasonable request where possible to do it, regardless of whether it was a public or private road and whether aid was requested by a road official or private citizen. We advocate uniformity in methods and work; a strict accounting for money expended; better work and more of it; construction of permanent bridges and culverts; making hard surfaced roads; attention to the earth roads and the use of the drag; better maintenance; cash taxes and State aid. We especially urge State aid, both cash and convict labor, for we believe it to be the key to the solution of the road work in general.

Office Maintenance—Like many other concerns of both private and public nature, and like the State itself, the State Engineer has been long on talk and short on revenue. The appropriations made by the Legislature for maintaining the office for the biennial periods have proven insufficient to meet the routine work of the office. For this reason many of the things planned and mentioned in my former reports have never been carried out. One was to make a systematical study and test of road materials of the State, the first step toward which was the installation of testing machinery. The cost of one-half of this machinery, established in conjunction with the engineering school of the University two years ago, would have been lost to my present four-years term had not the University Engineering Experiment Station come to the rescue. During the past few months the Engineering Station has paid the expense for collecting samples of hard road material from the several counties of the State. These samples will now be tested and the results issued by the engineering school in bulletin form.

It was necessary toward the close of the last biennial period for localities desiring our services to pay the necessary traveling expenses. These have been paid upon twenty-nine trips, some of which were paid from the institute funds for road lectures at farmers' institutes, while twenty-six other localities requested our assistance but did without it rather than pay our necessary traveling expenses. No bulletin matter was sent to press during the past nine months; the services of a stenographer were dispensed with on August 1st, and my deputy quit several days earlier than he otherwise would in order to cut down the running expenses of the office. These precautions were not effected quite soon enough, however, and the ledger balances on the wrong side, the deficiency for the biennial period being about two hundred dollars.

Engineers' Association—At the instigation of the State Engineer, the county engineers have formed a Highway Engineers' Association of the State, the object and purpose being the exchange of ideas relative to securing uniformity of methods, the establishment of closer relations and the advancement of knowledge pertaining to road building and maintenance among the county highway engineers.

Overseers' Schools—I have given all aid possible to the road overseers' schools of instructions, and I am convinced that the law requiring that all overseers of a county be called together for instructions at the county seat by the county engineer, at least once a year, is one of the best features of our road laws.

Effect Upon Schools.—Further efforts of the office have been to determine the effect of bad roads upon public school attendance and to locate and map the old State and Government roads in the State, and to collect the history and other data relative to them. Almost every large and important town or city of the State is upon one or more of these old roads or trails which opened Missouri to settlement. Their traditions and history should be preserved, and much of the information concerning them will soon be lost if not collected and preserved.

State Aid—There is no question but that our roads have gradually improved with the development of the country, but they are not improving as rapidly as conditions warrant or as fast as they should. We are content to work on too cheap a plan. This office has been a constant supporter of State aid for road purposes because *State aid,* in both revenue and supervision, is the *key* to the solution of the problem. State aid expended and controlled through the authority of a State Highway Department will solve the problem, for under this spur and stimulus the districts and counties will provide their share of the cost and all the other matters will right themselves to conform to it. From my experience and observation in road making, I feel free to say that there is no greater stimulus to the improvement of a state's public road system nor inducement to the construction of permanent work than State aid. State aid is for the general public welfare. It is the principle which should govern in any improvement for the general good, like the public roads. We cannot succeed with a Chinese wall around each community, each county or each state. The road question is larger and more far-reaching in effect than the community. The public roads are too important a matter toward any state's progress and prosperity to be neglected by the State.

State Convicts—In former reports I advocated the use of some of the State convicts upon the public roads, which advocacy I wish to renew. I do not advocate scattering the convicts out along the road, but would keep them confined strictly to quarrying and crushing, leaving the hauling and the work necessary to the completion of the road to be performed by the community for which the road is being made. Road material of average quality is accessible in almost every county of the State, and in a number of counties it can be found within reasonable hauling distance of any road. With concentrated camps of State convicts to prepare this material for the road and with a systematic order of distribution and application for such work, much assistance can be given in the form of State aid to road work.

Earth Roads—It has been my endeavor to give attention to the maintenance of the earth roads. Over 95 per cent of our roads are earth, and it will be some years before as much as 10 per cent of them will be anything more than that. Hard surfaced roads are too expensive to build and maintain to plan rapid progress in their construction. The earth road cannot possibly be made of equal superiority with the well built roads of other materials, but neither is the earth road as expensive, and it is within the reach of every community where the rock road may not be. If the well kept earth road proves sufficient for the demands it is enough, and it is unnecessary to make larger expenditures upon it. The country road will be built of the most available material, and the solution is not so much one of building expensive roads, but satisfactory ones, with this available material, and which, after all, resolves itself into a question of administration. Especially a question of administration when applied to the earth road. The largest mileage will, and should be, earth roads for a long time to come, and in the meantime the best should be made of them that the means and natural conditions permit.

Permanent Crossings—With this care of the earth road, attention must be given to the construction of good, substantial and permanent culverts and bridges. The Highway Department should be given more control over this feature of the work in order to prevent the substitution of unsubstantial or unsightly structures. No so much to procure the structure at a less cost, but to obtain a suitable one, worth the price paid for it. As the roads improve the loads increase, and it is both safety and economy to build permanent culverts and bridges. Well maintained earth roads with good bridges and culverts is the solution for the majority of our road difficulties.

Main Roads—Where the travel converges upon our main roads, making the traffic too heavy to maintain earth roads, they should be hard surfaced as fast as possible. These roads are of enough importance to justify the increased expenditure. This is another feature of our road work over which the State Department should have more power of control. A road is not made by piling on the material in a haphazard way without attention to the foundation or drainage. Using more material than is necessary is another waste. Money is being wasted in all these ways in Missouri. It costs too much money to make good roads for the work to be done in a careless manner or without attention to the principles of road building.

Demonstrations—Demonstration work, owing to the lack of funds, has been limited. Five or six small demonstrations upon concrete or the road drag, road exhibits at the State Fair and at the sessions held by the State Board of Immigration at Springfield and Moberly, and a road making demonstration trip over the line of the Frisco Railroad from St. Louis across the State, by the way of Springfield and Lamar, will complete the list. These, however, while in a small way for the purpose of illustrating some feature of work adaptable to the particular locality in which the demonstrations were made, have not been entirely void of good results, as may be seen by reference to an article on "Road Demonstrations," now being prepared for publication in the Annual Report of your Board.

Road Records—Further, my policy has been to build up the roads as a road system and to obtain uniformity in methods and a system of work, and in keeping records. Records of contracts and of the roads themselves have been kept in a very careless manner, if kept at all. We find there is no record of at least one-fourth of our public roads, and some of the records which are found could have but little standing in the courts. One of the greatest disadvantages our engineers have in the enforcement of the road work is the lack of any record of the roads themselves. If the reader doubts this, glance at the one example given below of many of our road opening records. It is a true copy of a county record filed in 1881, and upon which I was called in for advice:

"Beginning at the ——— and ——— road where the line between Hall and Jones intersects said road near the S. E. corner of N. W. section 34-31-26, thence W. past the house of Hall to the McCullough farm, around the W. side of said farm, also on north side of A. Gillespie's and McFaddler's farms on E. side of Turnback near the bluff to N. W. corner of Fiddler's field, thence W. to creek crossing at the Cow ford, thence up the creek to R. R. crossing. Thence following traveled road W. of Gillespie's barn, thence westerly to lane between Gillespie and Fiddler, thence following traveled road to near the S. E. corner S. W. N. W. Sec. 33-31-26, thence W. along center line of Sec. 33 to near W. line. Thence following old road past residence of old man Jeffries striking center line of Sec. 32 near S. E. corner of S. W. N. W., thence W. on line past house of Jas. Jeffries to W. side of a hollow, thence in S. W. direction to crossing on Limestone near line between N. E. S. W. and S. E. S. W., Sec. 31, thence W. to intersection of................. and .... road."

County Supervision—The office of county highway engineer directly concerns this office. It is allied to this office by mutual interest and should be by law. I would refrain from mentioning it but for the fact that it is a very unpopular law, and, under the present form, it is doubtful if it will withstand the unfavorable sentiment. The county highway engineer law provides the way whereby any county may avail itself of good supervision, but much of the present dissatisfaction seems to be over the fact that such provisions are now a part of the road laws, while there are enough people in some counties looking for excuses and means to keep from making roads to prevent the fulfillment of the law's intentions. The law intended that the county highway engineer should be the county superintendent of roads, and that he should have control and supervision of the road work and the overseers of his respective county. It is the law of the State and is mandatory upon each county court to appoint an engineer, but the office may be suspended in any one county by a vote of the county. The local option feature went into effect less than two years ago, since which time, from reports received, twenty counties—every one where it was voted upon—have suspended the act. From my information upon the question there are not over a dozen counties in the State that would not do the same thing if someone took the trouble to get the question put upon the ballots. The control and supervision of road affairs is going through the same fight which that for the supervision of schools and other public affairs went through. Close supervision of road work is ahead of the times, and we have got to fight it out along these lines till it does eventually win. Does the taxpayer want his road taxes spent in a loose, unbusinesslike way, or does he prefer to feel that there is some effort being made to properly supervise the expenditures? If any taxpayer wishes to get a comparison between the old methods without county supervision or those in vogue under the county highway engineer, let him investigate for himself in any county which has complied with the intent of the law and provided a competent man.

The law creating the office of county highway engineer is good, and is sound in principle. If every man would acquaint himself with the loose methods of the past forty years, namely, the condition of our road records, the utter disregard for road laws and road regulations, and the unsystematical ways in vogue, he would certainly see the necessity for a county highway department. The county engineer can, in many places, collect more of the poll tax than was collected before him, get the funds upon the road at a less percentage for overseeing and can gradually bring order out of chaos.

Take, for example, the cases of Lawrence and Moniteau counties, where the cost of overseeing was formerly about 50 per cent of the funds; the engineers reduced it to 20 per cent and 30 per cent, respectively. In one district in another county, it was costing 97 per cent of the funds to get them on the road. With the same overseer the engineer succeeded in reducing this to 40 per cent the first year and 30 per cent the second year. One other county showed 30 per cent saved in the purchase price of road tools alone (and this is one county which voted to do away with county supervsion), and in still another where only 50 per cent of the poll taxes were ever collected, through the attention and spur given the road interests by the engineer. 95 per cent of these taxes are now collected.

The amount of work for which the engineer is called upon is evidence enough of the need for such an official. The county court of Greene county signed a voluntary statement to the effect that the county highway engineer filled a long felt want, and that the position saved $4,000 in different ways to Greene county in the year 1908.

The cost of the county highway engineer to the county is not greater, in many instances, than the sum of the fees paid out under the old fee system. Take, for example, the county of Buchanan, where in the year 1908 the amount of salaries paid into the county highway engineer's office was $4,400, and the year preceding the advent of the county engineer the fees for road supervision cost the county $4,608. In Chariton county the salary of the county highway engineer is $1,500, while the last year before the engineering supervision the fees paid the ex officio road and bridge commissioner were $2,194. In Johnson county similar comparison shows fees under the last year of the old law to have been $1,550; the county highway engineer's salary is $1,200. In Pettis county the fees were $1,280 and salary of engineer is $1,400. In Mississippi county, the fees were $1,330 and salary of the engineer $900. In Scott county the fees for road supervision averaged over the seven years preceding the county highway engineer act $1,730, not including fees of records of several instances where special commissioners were employed. The county engineer was paid a salary of $1,500, and this is another county which suspended the act. Besides this, the engineer has the supervision of road and bridge work, of the overseers, of the surveying, ditching and clearing of the right of way, and a number of other duties are required of him than were of any man under the old system, or ever will be required of an ex officio county highway engineer. His whole time and attention is required upon the county's roads, for which the county is paying but little or no more than it formerly paid out in fees for inferior service. And, furthermore, the pay of the county engineer does not keep the amount of his salary from the roads because he is paid out of the county funds, as any other county officer is paid, and not from the road funds.

Six years ago Dallas county paid $4,450 for 120-foot steel bridge with approaches. Under the engineer's plans, by rejecting bids and re-letting, a similar bridge recently was built for $2,750. In the adjoining county of Polk, where a similar condition existed, a contract was closed upon our plans in which all bids were rejected two different times, the first received being over $5,000. The contract price was finally closed for $2,650, or about one-half that paid by the county for the same sized structure a few years ago, and a little more than one-half the amount of the lowest bid first received.

Six miles of rock road was constructed in one county at an average contract price of $4,200 per mile, exclusive of grading. A few other roads have been built in that vicinity, under similar conditions, which cost $6,000 per mile. This reduction in cost is due to the difference in plans and methods for construction, and as good a road exists in one case as in the other.

These examples will not apply throughout the State nor is the value of the engineering offices altogether in reducing the cost of work. In some cases it has increased the cost. Plans have been made or changed which neither increased nor decreased the cost of the work, but give better work for the same cost.

These are only a few examples of what may be corrected by good supervision. Many names and localities are purposely omitted. It is difficult to change the customs and habits of a century, but it seems that if any taxpayer in any part of the State would take a little time for investigation of road affairs he could not object to knowing that his taxes were being spent with at least some semblance of skilled supervision. Unfortunately for many, there are two things every man thinks he knows how to do—one is to build a road and the other is to judge a gold mine. The road work can never be successful while it is a side business for everybody. Men must attend to their own individual business upon which their living depends, and they are usually too busy at that to properly attend to road affairs. As a general rule a man must give some one thing his time and attention to become trained or skilled. In every community somebody should be trained for road work and kept in charge of it while the other people are attending to their own individual affairs. It is slowly being recognized that every man is not a born road builder, and the sooner the roads are put under trained supervision the better it will be for the roads.

Our vast sums of road expenditures without a legal head and competent, trained supervision is a proposition of folly. If we assume that road building is to make use of natural materials in such a manner as to produce the improved road and that the roads should be built to meet the needs and the demands of travel coming upon them, it follows that all the roads should not be rocked, graveled or oiled, neither should all be of earth. The State has such a diversity of road-making material that no one method or plan of construction is adaptable in all parts of the State, and plans must frequently be varied over one county. In one section rock construction is best, in another gravel and in still others sand-clay or chert. A special feature in some counties is the well-dragged earth road, while in others concrete or masonry in culverts or bridges may be pre-eminent. It is necessary for the highway engineer to study the field and choose the methods, plans and materials adaptable to the locality, and a competent county supervisor, trained in road building, is absolutely necessary if the best results are to be expected.

Our present laws for the county highway engineer do not go far enough, if they are defective in anything, for instead of merely a county highway engineer we should have a *county highway department*—a highway department (not merely an office) in every respect, put upon a footing and given recognition with other offices and departments, and stop peddling out so important a work as that of supervision of roads and highways. The county court should no more have control of the roads and road work than that of the schools, the county collector, or assessor, or attorney's office.

A county judge is not elected because he is a dentist, a lawyer, a stone mason, a road builder or a skilled artisan of any particular kind, but because he is a good citizen and has sound judgment upon affairs in general. The county judges, invariably men of good character and standing in their communities, cannot, as a rule, as individual members of the court, supervise the actual work, draw plans, make estimates and look after this part of the county's business. There should be a county highway department in every county of every state with powers for execution of the actual work, unhampered by courts, boards and commissions. The official of this county department should have authority to act upon his own initiative, be free to carry out his own plans and details of his work, and should receive compensation in accordance with the importance of the work and skill required.

A capable man in such a department will see that the work is done right, protect the county against unscrupulous contractors, open the road drains and prevent the roads from being used for artificial farm drains, cut the hedges, clear obstructions from the right of way, create a wholesome respect for the roads and the road laws, assist in correction of the road records, know how many tools and implements the county owns, know how and where the road money is spent, regulate accounts and avoid excessive bills, be an aid to the overseers and build up a road working and maintenance system and organization. A thousand small details can be attended to—things small in themselves which any man of good sense can do but are otherwise left undone, simply because it is nobody's business, in particular, to look after them. The cost of such supervision of the road work of a county is money saved and not money lost, and if any county does not improve road conditions under it, it is the fault of the county and not of the law. The county must get a man competent to fill the position—the law cannot legislate brains into men.

Maintenance—Many people advocate expensive road building without a thought for maintenance. Any road will wear out, and as soon as a road is built provision should be made for maintaining it. Maintenance is second in importance to construction, and we must not lose sight of the fact that a good earth road is largely a question of maintenance. Before we can have a good system of roads, we must have a maintenance system—a continuous maintenance. The county might own an outfit and employ a crew of men to do nothing the year around but keep up the roads of the county. This road working crew, with the necessary equipment and a good foreman, could work out a part of the taxes of each district under the direction of the engineer or overseers, thereby saving the overseer's time upon the roads and work the roads in a season when they should be worked, from early spring to such time as grading should be stopped. Employ them for the remainder of the year upon culvert work, graveling, and other work seasonable for fall and winter. Or, a dozen districts could band together in a similar arrangement to work out a part or all of the district funds. It is the most economical in the end and will eventually develop a class of men who make it their business. It will be their duty to care for the roads while other men are attending to their own particular lines of business.

Any kind of a road will be gradually worn out and this loss must be replaced or the road will gradually go down. The old adage is true that a "stitch in time saves nine." Any road of good material will become unevenly worn in a few years, and it is then necessary to add new material if it has not been added continuously during the time of wear. In any event, the continuous maintenance system in advantageous over that of any other. The system of going over and repairing the roads once a year or once every few years is not maintaining, but it is rebuilding. There are seasons of bad weather and initial destruction when a one-man patrol of our roads would be more effective than any other method. The road district should be of suitable mileage to employ an overseer by the year. During rainy season, the winter months and at all times out of the actual road working season this overseer, provided with the necessary equipment, should patrol the roads under his care. This overseer, and those of a county under the direct control of the county supervisor and highway department, who in turn has a

State Highway Engineer and State Department with whom to consult and advise, would constitute an economical and effective organization and working system for road building and maintenance. A working organization whereby any community may acquire permanent maintenance and skilled supervision of roads.

Cash Taxes—No better reason exists for a man to work out his road taxes than for him to teach out his school taxes. The working out of taxes is an inadequate, inefficient and indefensible form of revenue. The men who work out their taxes, as a rule, know nothing and care but little about the work. Many of them work with the sole idea of working out the taxes, not to benefit the roads. It is not so much the fault of the men as it is the fault of the system, a "venerable" system, which has been handed down from generation to generation until it has become rotten with age.

Elimination of Politics—Another indication of rottenness in our "venerable system" is the infusion of politics into road affairs. The roads do not belong to any part, set, or faction, but are the property of all. In some of our counties the road affairs are nothing more than a political machine. In more than one instance the roads have been made to suffer in order to reward a political worker. This can never be entirely eliminated from the business, but a healthy public sentiment for the selection and the retention of men for their fitness for the work rather than for their political affiliations will be helpful.

Cross-State Roads—The idea for cross-state roads is a commendable one in some ways, but they should be considered in the light of a series of connected local roads, and therefore their value in a local sense rather than that of through travel. Through roads will serve long distance travel more from the view of pleasure than a commercial value. But we should not lose sight of the fact that roads should be built for the comforts and pleasures of travel as well as their pecuniary value, while the cross-state road has a commercial value as a through road, since it will aid in the development of the State. On the other hand, it is the improvement of the local road, the road from the granary to the railroad shipping point, the road which builds up the social, education and commercial sides of the country and community life, that are so badly needed and which will serve the best interests of the State. Water and rail are the established means for long distance transportation, the highway for local exchange. The electric road serves the purpose of local transportation to a limited extent, but no means of rail transportation can reach every man's farm, cannot possibly usurp the place of the wagon road. The wagon road serves the purpose of local transportation and is the connecting link for local traffic with the means for long distance transportation. Placing markers upon old trails and expending energy and money upon cross-state roads does not serve the best interest of the State, nor of road improvement, unless they be so routed to be of value to the local communities through which they are built. This question of good country community roads is one of the most vital with which the people of Missouri have to deal today. There is no one internal improvement so necessary and essential to the progress and prosperity of the State as that of the betterment of the highways, the betterment of the means for local transportation and country community life, the improvement of the local wagon road.

Yours truly,
CURTIS HILL, State Highway Engineer.

REPORT OF STATE VETERINARIAN.

Dr. D. F. Luckey.

Mr. President and Gentlemen of the Board of Agriculture:

In most lines of veterinary control work we have made gratifying progress during the past year. The losses in sheep through contagious diseases have been comparatively light. The number of cases of glanders outside of Kansas City were phenominally low. We made good progress in tuberculosis eradication work considering our limited force. This Department, however, was unable to accomplish anything at all by way of controlling hog cholera, and did not get satisfactory results in the eradication of Texas fever ticks in southern Missouri counties.

SCABIES.

During the year there were thirty-seven shipments of sheep and six of cattle affected with scabies from this State to the public markets. Reports indicate quite an extensive outbreak of scabies among sheep in the range in the western part of Camden county. For the lack of funds we have been unable to take charge of this outbreak. As soon as possible we will cause all of the diseased sheep to be rounded up and kept in close confinement until they are properly dipped and cured.

FOOT-ROT.

There were only four shipments of sheep from this State affected with foot-rot reported. There is no indication that there will be any serious loss from this disease.

LIP AND LEG DISEASE.

There were only three shipments of sheep affected with lip and leg disease from this State during the past year. The statutes of the State forbid the importation of sheep affected with any contagious disease. Many requests were received for permission to ship sheep from the western ranges, where lip and leg disease is quite prevalent, to be fed in quarantine. On account of such permits being in conflict with the law of the State, none of the requests were granted. It is claimed that the disease is easily cured, and if this be the case the owners of affected bands of sheep in the west should give them proper treatment and cure them, and not ask for permits to ship them into this State in a diseased condition. The rigid enforcement of a law forbidding the shipment of diseased sheep will undoubtedly have a strong tendency to cause those who own affected bands of sheep to administer proper treatment and cure the disease.

GLANDERS.

During the year eighty-six cases of glanders were found in Kansas City, sixteen in St. Louis and four in the rest of the State. There were only 106 cases in all. Probably no other State in the Union would show so few cases of glanders. Official reports of many of the smaller states show as high as eight or nine hundred cases.

You will note that there were more horses condemned in Kansas City on account of glanders this year than last year. This may be accounted for from the fact that the veterinarians perfected an organization and worked in co-operation with the team owners' association in locating as many cases as possible. Through the combined efforts of the local veterinary association and the team owners' association, the authorities of Kansas City have been induced to do away with the public watering fountains, which for so many years have been a source of infection, and in all probability the number of cases of glanders in Kansas City will be greatly reduced within another year.

HOG CHOLERA.

Hog cholera is still more or less prevalent in all parts of the State. It is my opinion that with the proper application of hog cholera serum and prompt rounding up and quarantining of diseased lots of hogs that the disease can be completely eradicated from the State and all losses from it entirely stopped. I wish to repeat my recommendations of 1909 and 1910 to the effect that the Board make arrangements with the Experiment Station for a supply of serum to be kept in the hands of competent deputies located in all parts of the State for use in the prompt suppression of local outbreaks of hog cholera. By making this arrangement and having it thoroughly understood among hog raisers that we will promptly take charge of an outbreak of cholera, we are sure of their co-operation in suppressing this disease.

Up to the present time it has been unsafe to allow the shipping of hogs from the public markets for stock purposes on account of the fact that the yards are permanently infected with hog cholera and shipments therefrom would spread cholera throughout the State. By injecting stock hogs at the yards with serum they can safely be shipped to the country for stock purposes. A great many hogs are received at the public markets which would be more profitable as stockers than for immediate slaughter. Piggy sows are often slaughtered and tanked, and thrifty shoats are slaughtered when they could be taken to the country and fed out at a good profit. If the State will prepare to supervise the injection of stock hogs at the public markets we can stop a waste that amounts annually to a great deal more than the entire cost of maintaining the State Veterinary Department. I recommend that arrangements be made as promptly as possible to stop the waste caused by slaughtering piggy sows and thin hogs that would be very profitable if taken to the farms in this State.

TEXAS FEVER.

We were greatly disappointed in the results of our tick eradication work in Southern Missouri during the past season. A total of $4,498.97 out of the veterinary appropriation was spent upon this work, and in addition to this, the cattlemen of Oregon county spent $364.44, making a total of $4,854.41, spent by the State and cattle owners in tick eradication work. In addition to this the Federal Government paid out the sum of $5,157.15 in co-operation with the State in this work, making a total of $10,011.56.

Of the State appropriation $1,083.03 was paid out in work in Ripley county, $364.44 in Oregon county, $1,415.40 in McDonald county, and $1,392.34 in Newton and a small area in Jasper county, and $172.40 in Ozark county.

In all of the localities where tick eradication work was carried on there were a few people who refused to keep their cattle free from ticks or to round them up for inspection. At the beginning of the year a supply of material for making the arsenical dip was purchased and distributed for use of the cattlemen in disinfecting their cattle without any charges. This arsenical solution is very effective in destroying ticks and it is not harmful to the cattle. The State has therefore paid the salaries and expenses of the men, furnished the dip and done everything that could possibly be done to encourage eradication of the Texas fever ticks from quarantined areas in this State, and thereby to get the quarantine removed. In Ripley county there was such a per cent of the owners who refused to keep their cattle free from ticks or to round them up for inspection that the work there was dropped September 1st, it being evident that nothing could be accomplished this year. Reports show that cattle carried mature ticks after September 1st in 18 lots in Oregon county, 43 in McDonald county and 26 in Newton county. The presence of mature ticks on cattle after September 1st is almost certain indication that the ticks will be in the same range next year. It can therefore be readily seen that very little progress was made in any part of the State in tick eradication work during the past year.

This work consumed about one-third of the State appropriation available for the year's work and was carried on at the neglect of a great deal of other work that was really of more importance. It does not seem just to the rest of the State to spend so much time and money in tick eradication and neglect other important lines of work. It seems that it will therefore be necessary to adopt a different policy during the coming year. The best course, probably, under present conditions, will be for the Board to place these infested counties or portions of counties in absolute quarantine and simply enforce the quarantine line and not attempt any further tick eradication work until the cattle owners take a more active interest in the matter. There ought to be no provision for inspection for the reason that as long as cattle owners can move cattle by inspection they will not take an active part in tick eradication.

If in any of the quarantined counties there is an organization and effective work done, the State may then furnish inspectors to make systematic examinations of the cattle during the later part of the summer to ascertain whether or not such territory can be released from quarantine.

The Texas fever quarantine regulations of this State, adopted in 1908, are now out of date, and I recommend that they be abolished and a new proclamation issued quarantining only the infested areas within this State. The Federal quarantine regulations are ample for the protection of the State against the introduction of Texas fever from other states, and without affording any further protection the State regulations simply complicate the matter of shipping southern cattle.

TUBERCULOSIS.

All tuberculosis eradication work has gone on in a most satisfactory manner. On account of lack of force we were not able to keep up with this work. We were continually over-run with applications coming from the owners of permanent herds. We condemned enough cattle to cause a deficit in the fund for paying for diseased animals.

We tested the dairy cattle around Warrensburg and Hannibal and were requested to make a test of all those around Independence. In the case of Independence, the testing was delayed until 1911, on account of the fact that we were over-run with other work. We are at present retesting the herds around Hannibal in which diseased cattle were found last year and are finishing other work which we were unable to finish last spring before time to take up tick eradication work.

The results of the tests around Hannibal are a fair index of the condition of dairy cattle around the smaller cities of this State. Of the 192 herds which were tested, 23 were found tuberculous, or one in nine. An animal that gave a suspicious reaction to the test was found in four additional herds. In 15 out of the 23 herds the owners had no idea whatever that any of their cattle were tuberculous. We found one herd of registered dairy cattle badly diseased as a result of the addition thereto of a tuberculous animal some years ago, and further found that this herd had spread the disease to 7 other herds in the neighborhood of Hannibal. We tested a total of 1,688 cattle, of which 68, or 4 per cent, were found tuberculous. The dairy cows in the older dairy districts around St. Louis, Kansas City and St. Joseph will show at least twice as large a per cent of tuberculous stuff, while the herds scattered through the State may show a smaller per cent than was found around Hannibal.

We have secured a supply of official tags each bearing the initials, ''Mo. B. Agr.'' and a serial number, which we expect to insert in the ears of all cattle which we test. All diseased animals will be removed from the herds that we test and the presence of these tags in the ears of dairy cattle will therefore indicate that they have been tested for tuberculosis and are sound. The use of these tags have the additional advantage of enabling us to ascertain the accuracy of our work.

EDUCATIONAL VALUE OF TUBERCULOSIS ERADICATION WORK.

The protection of our permanent herds against the spread of tuberculosis, and the public against the use of dairy products from tuberculous cattle, are of sufficient value to warrant aggressive eradication work. It seems now that the educational value of this work is to be greater still. While a great deal of instruction is given on tuberculosis eradication, both among the lower animals and among the human family, very little actual results have been accomplished. Tuberculosis cannot be eradicated without the enforcement of State laws and city ordinances. The education of the individual is an absolute necessity. Every individual must understand and put into practice certain very simple yet essential principles of sanitation. There is nothing that will cause active and accurate thinking along the lines of prevention of tuberculosis more effectively than demonstration with the lesions of the disease from tuberculous cattle. This seems now to be the keystone of all sanitary education. The impression is general that the education coming from tuberculosis eradication work among cattle is of inestimable value in that instruction which looks to the prevention of tuberculosis in the human family. Concerning the educational value of demonstration with tuberculous cattle, I quote from Ex-Governor W. D. Hoard in his report to the International Commission on the Control of Tuberculosis, as follows:

"From what I have seen in Wisconsin, I am convinced that the most powerful aid to that action against the disease which this Commission is so anxious to bring about is public demonstration. One animal slaughtered before a body of farmers, and the diseased parts exposed to their plain view, is worth more to foster conviction and inspire effort than anything else that can be done. If the Federal and State Governments would devote means for this demonstration work, it would prove a most powerful educator. Public agitation, in farmers' gatherings, and the talk of the agricultural press is useful mainly in keeping alive an interest in the subject. But, gentlemen, we must remember that with the majority of men, a large majority, 'seeing is believing.' "

In our plans for securing sanitary education and public co-operation in our work, we expect to demonstrate with diseased specimens before the high schools, city councils and other organizations of the various towns of this State. We expect also to go before local organizations of dairymen and give them instructions as to the nature of tuberculosis and explain the working of the laws of the State and the plans of the veterinary department.

TUBERCULOSIS QUARANTINE REGULATIONS.

As was anticipated, the tuberculosis quarantine regulations adopted by the Board a year ago were deficient in some minor details. These regulations made no provision for the admission of cattle into the State for immediate slaughter. They required an affidavit from the shipper that steers would not be used for breeding purposes. They required the tuberculin test of only breeding and dairy cattle received at the public yards from other states. To make the regulations practical and effective, all of these points must be changed. A permit should be issued for the importation of steers and cattle for immediate slaughter without the requirement of the affidavit. At the public stock yards it is practically impossible to keep those animals received from other states separated from those received from this State. There are always traders about the yards who practice bunching cattle from all sources in such a way that it is impossible to keep track of their origin. In order to make these regulations effective they should be modified to provide for the permit for removal of all cattle from the public stock yards, no matter for what purpose. The judgment of the inspector in charge will largely govern as to whether or not the tuberculin test or the affidavit is necessary.

A man representing the State ought to be placed at each of the public markets to attend to this inspection, together with the supervising of the injection of hogs with hog cholera serum for shipment to the country for stock purposes.

We were unable to get the quarantine regulations thoroughly understood and in operation during the past year, and undoubtedly some shipments of cattle into the State were made without the regulations being complied with. However, we now have the machinery in good working order, and there is practically no chance for the further introduction of tuberculous stuff. Since the regulations were put into effect May 1, 1910, 2,637 shipments of cattle for pasture and feeding or immediate slaughter were made, covering 102,908 head of cattle. We received certificates of health giving the tuberculin test of 1,310 lots for 2,003 head of cattle for dairy or breeding purposes.

As would naturally be expected, some of the inspections made of cattle for importation into the State were deficient. In one case the certificate covering the shipment of 52 head of dairy cattle showed so plainly that the inspection had been carelessly made that the cattle were held for retest at destination and six head out of the 52 were found to be tuberculous. In another shipment of 32 head, of which the certificate of health seemed deficient, a retest was made after arrival at destination and 6 head more were found tuberculous. We have no way to ascertain definitely how many tuberculous animals were kept out of the State by the operation of the quarantine regulations.

INVESTIGATION.

Reports received at this office indicate that "swamp fever" or "pernicious enemia" among horses has gradually spread from the areas in southwest Missouri, where it existed last year, and now affects horses over almost the entire southwestern part of the State. The manner in which this disease spreads from one animal to another is not yet thoroughly understood, and it is therefore impossible to adopt intelligent measures for its suppression. Unless some discoveries are made in the near future by which we will be enabled to control this disease, I recommend that the Board employ a specialist for a few months sometime during the coming year to make a special study of the nature of this disease.

APPROPRIATIONS.

For the lack of sufficient appropriations we have been compelled to do all of our work in a hurried manner and to neglect a great many outbreaks of disease that should have been thoroughly investigated and controlled. We will need an inspector at each of the public markets next year to perform the duties that I have outlined above. We ought to avail ourselves of the benefits of the hog cholera serum and do aggressive work in stamping out hog cholera. The requests for the tuberculin test are coming to the office in increasing numbers, and if we expect to attain success under our present plans we must be prepared to answer these requests as fast as they are received. It is impossible to tell how many requests will fall to this office during the coming two years, but we ought to be provided with the funds to answer them regardless of the number and to carry on tuberculosis eradication work and public demonstrations with a view to hurrying through with the tests of the permanent herds of this State. It is plainly evident now that it will require $60,000 for the payment of salaries and expenses for the work that will fall to this department for the coming two years, and I recommend that the Board attempt to secure an appropriation of this amount. For a number of years the small amount appropriated for the payment of diseased animals has been deficient. Without a single exception in the past ten years there has been a deficiency in this fund. The delay in the payment of the small amount of indemnity allowed by the State has caused some dissatisfaction. The State ought to be prompt in performing its obligations in this matter, and the fund for paying for diseased animals should be sufficient to make prompt payments of all claims. I therefore recommend an appropriation of $60,000 for the payment of salaries and expenses of the office and the sum of $15,000 for the payment of diseased animals condemned.

Respectfully submitted,
D. F. Luckey,
State Veterinarian.

REPORT OF APIARY INSPECTOR.

M. E. Darby.

Mr. President and Gentlemen of the State Board of Agriculture:

In presenting this, my fourth annual report as Apiary Inspector, I take pleasure in assuring you that a greater interest has been manifested in the line of apiarian work during the year just closed than in any preceding year of its history.

This new interest is not displayed by the bee keepers alone, but by men and women from the various walks of life who begin to recognize Apiculture as an important branch of agriculture and worthy of recognition and protection. In the work of inspection, many parts of the State have been visited, and the work pushed to the best advantage under existing conditions. Other parts have asked for help, and will receive attention as soon as it is possible to give it. But it is impossible for one man to do all the work and get over all the territory in one summer. During the season for inspection work, 3,635 colonies were examined, with the result that 140 colonies, or a little less than four per cent, were found diseased.

This is more than a fifty per cent gain in our efforts to control bee disease, which certainly is a very gratifying result to be obtained in four years, when we consider the many disadvantages labored under during this time. In connection with the regular work, I have taken advantage of every available opportunity to meet with farmer's institutes, horticultural societies, land congresses and bee keepers' associations, where I could have the opportunity of explaining my work to the people, and of giving them some information along practical lines. In these efforts I have been very kindly received, and very much encouraged in the work.

While I am glad to be able to report a reasonable degree of success in my effort to control bee disease and diffuse apicultural information among the people, it pains me to make the admission that the larger per cent of our population is yet almost entirely ignorant of the true worth of the honey bee, and the part it performs in our national life and activities. Taking the figures given by the Bureau of Labor Statistics, Missouri has 225,000 colonies of bees, which annually produce about 6,750,000 pounds of honey, worth, at 15 cents per pound, $1,012,500, and 19,000 pounds of beeswax, worth, at 25 cents per pound, $4,740, making a total of $1,017,240.00 annually for this industry. A large per cent of the honey produced is consumed at home and in home towns, consequently does not find its way into the general markets. But it is supplying the table of the possessor with one of nature's purest and most healthful of all sweets, one so pleasant to the palate, and so pleasing to the eye, rich enough in its natural and artistic beauty, to grace any table, whether it be in a cottage or palace.

HONEY MAP OF MISSOURI.

Built by the combined forces of three strong colonies of bees, under the supervision of the State Inspector. Exhibited at Missouri State Fair, October 1-7, 1910.

These 225,000 colonies of bees give an average of less than one colony per farm for each farm in the State of Missouri. With the proper encouragement and protection, ten times this number could easily be kept, which would give over ten million dollars annually to the wealth of the State. Twenty times this amount would be a reasonable possibility. In many parts of the State are to be found large areas of pasture lands covered with white and alsike clover, while in other parts are to be found the broad acres of Spanish needle and heartsease where but a few bees are to be found, and tons of honey are going to waste annually for the want of bees to gather it.

Other parts of the country not so well supplied with nectar-bearing plants, can be improved by the planting of honey producing trees and plants that are valuable in other ways besides honey production. Among those worthy of mention in this connection are the fruit trees and berry plants the clovers, especially the white, the alsike and mellilotus or sweet clover. The latter has until recently been considered a worthless weed, but now it is proving itself to be a soil builder. Buckwheat is also worthy of mention here. Melons and cucumbers, where grown commercially, have been known to yield handsome crops of honey. The same can be said of lima beans and many other crops, when grown in large quantities.

While thus planning for larger crops of honey, and the future welfare of the honey bee, we should ever remember that in the pollenization of the bloom the bee is rendering a service that is the full equivalent to the amount of toll she exacts from the flower for performing this service. We do not fully appreciate the bee's good work, for the reason that we are unable to count its value in dollars and cents.

The influence of bees in the production of seed and fruit is a subject that brings bee culture into a very close relationship with practical and scientific agriculture and horticulture.

A closer study of the bees and flowers, and their great mutual benefit plan, ''give and receive,'' is commendable to all, and especially to teachers of our public schools, for in the study of their life and habits, their relationship and mutual dependence, the one upon the other, we find a most beautiful and useful lesson in the harmony nature. Here we find the one getting its food supply from the other, out of a product —honey and pollen—that would otherwise be wasted; and while so doing is unwittingly carrying the pollen grains from one flower to another, thus performing a service which means the perpetuation of the species in the other. In the inauguration of this great plan, Nature seemed to forsee the ill effects of a perpetual self-fertilization, and made many provisions to prevent the same. Consequently we find in most plants a prepotency to foreign pollen; in others the flowers are sterile to their own pollen; in others the essential organs come to maturity at separate times; still others have their stamens in one flower and the pistils in another. Thus we see conditions brought about requiring the aid of animate or inanimate agencies for perfect pollenization of the flowers before seed and fruit can be produced, and of all animate agencies the honey bee is most important; the only one that is profitable outside the work of pollination.

When we fully understand that this work of pollenization in most of our cultivated fruits is performed principally by animate agencies, then can we see the necessity of properly caring for the honey bee, and the advantages to be derived by increasing their numbers. It is to be hoped that this important subject will receive more attention in the future than it has in the past.

In concluding my work I wish to say that I have to the best of my ability endeavored to carry out the work of inspection and education along lines I thought best to further the interests of apiculture, and to educate the public to the importance of the industry.

I have had more work than I could possibly do, so have worked overtime to try to meet the demands for my service. In so doing, I have donated a great deal of time to this work after the funds for this work were exhausted, and have made many trips and paid my own expenses, but the kind words and warm hands received along the way have made me feel amply repaid. They have helped to lighten some of the labors and smooth over some of the rough places.

I entered upon this work with a love for the industry and a desire to see its full merits brought to the attention of the public; and I hope that I have done enough, at least, to drive from the mind of any member of your honorable body any possible thoughts that the Bee Industry is a foreigner to your work, and a "stinger" on your hands. And furthermore, that when you come to know it well, this collector and disseminator of sweets is a true heir in your great farm family, one whose life work beats in harmony with the great pulse of Rural activity; one who makes a modest claim of performing an important part in the economy of modern agriculture; and I sincerely hope that your honorable body will see fit to include in your recommendations for appropriations a sum sufficient to properly carry on this work.

Respectfully submitted,
M. E. Darby, Inspector.

REPORT OF DAIRY COMMISSIONER.

Dr. W. P. Cutler.

To the Honorable Board of Agriculture:

The year 1910, just closing, has seen a remarkable increase in dairying in Missouri, especially in the southern part of the State. Notably in Howell county, dairy products have increased 100 per cent for the year. There has also been established in the Ozark country, from Springfield, south and east, three new creameries since my last report.

My work as Dairy Commissioner has been largely given up to attending dairy meetings in connection with professors of the University and other institute speakers of this Board, and advocating the advantages of Missouri as a dairy State—pointing out the unusually fine market, climate, abundance of water and feed to be had in this State.

It is my opinion that in the next ten years, if sufficient money is appropriated to carry on the work, and Missouri farmers can be shown the possible profits in this Department of Agriculture, Missouri will be one of the greatest dairy states in the Union. Nothing, however, but persistent hard work upon the part of those informed, supplied with sufficient funds to employ inspectors and instructors, will bring about this result. Every community in Missouri where milking is the practice is prosperous and happy.

One of the inspectors of the Department of Food and Drug Inspection, who is a graduate of the Agricultural and Dairy Departments of the State University, has been detailed to inspect the dairies and creameries in this State. He has located and reports 640 places where dairy products are handled, and is now engaged in making a census of the cows in the State, as required by law. This, however, will be a long and tedious work when made by one inspector alone.

On January 25 I attended the Land Congress at Springfield. One afternoon was given over entirely to the dairy interests of the Southwest, at which meeting the Commissioner presided. A great deal of interest was manifested which undoubtedly led to a large part of increase of the dairy interests in that section.

In February, a trip was made over the Frisco Railroad in the interests of Dairying.

ACCOUNT OF THIS MEETING.

The following appeared in a booklet recently issued by the Frisco railroad company:

"At the instance of Dr. W. P. Cutler, State Dairy Commissioner, arrangements were made for a series of free lectures to the people of Missouri to demonstrate to them the value of adopting improved methods in dairying and general farming, and the Frisco tendered the use of a special train for the trip made over its lines in February, 1910.

Addresses and lectures were delivered by

John H. Curran, Commissioner of Immigration.
Dr. W. P. Cutler, State Dairy Commissioner.
F. B. Mumford, Dean of Agricultural College.
M. F. Miller, Professor of Agronomy, Agricultural College.
C. H. Eckles, Professor of Dairy Husbandry.
Dr. Connoway, Professor of Veterinary Science.
Curtis Hill, State Highway Engineer.
J. C. Whitten, Professor of Horticulture, Agricultural College.
P. P. Lewis, President State Dairy Association.
C. A. Morten, Member State Poultry Board."

Thirty-three stops were made in a five-days' trip, beginning at St. Louis, thence to Springfield, thence to West Plains, thence to Cape Girardeau, and back to St. Louis. Fifteen thousand people were instructed and over forty thousand pieces of literature pertaining to dairying and kindred subjects were distributed. Great enthusiasm prevailed, and the Commissioner was requested to repeat the trip in the fall.

The following is taken from the Howell County Gazette, issue of February 24, 1910, of the meeting held at one of the stops. This is a good example of the interest shown at each point. Many points were necessarily passed, but it is hoped in the fall that the trip may be repeated, when stops will probably be made at these latter places:

West Plains was visited on Thursday of last week by several prominent speakers, who delivered free lectures at Catron opera house, to demonstrate the value of adopting improved methods in dairying, fruit growing and general farming. The party arrived in this city at 6 o'clock in the evening on a special train from the west. A reception committee met the special train at Willow Springs and accompanied the visitors to this city.

The special train started from St. Louis early in the week to make stops at the principal towns along the Frisco for the lecturers to deliver addresses. The train was composed of two private coaches, two audience cars, where the lecturers delivered their addresses in the smaller towns, and one baggage car, in which improved chicken coops and model chicken houses, milking machines, cream separators and other appliances were displayed which can be used in making farm life more profitable and enjoyable. Everywhere along the line, in spite of the prevailing snow storm, good crowds greeted the speakers. The schools and business houses in many towns were closed, and where it was convenient, the speakers were hurried to the town hall, where the addresses were delivered and there was comfort and enjoyment in hearing them.

Governor Hadley did not accompany the party, as was announced a week ago, owing to the illness of his little daughter. Those who composed the party were Dr. W. P. Cutler, State Dairy Commissioner; John H. Curran, State Commissioner of Immigration; F. B. Mumford, Dean of State Agricultural College; M. F. Miller, Professor of Agronomy, State Agricultural

College; C. H. Eckles, Professor of Dairy Husbandry, State Agricultural College; J. C. Whitten, Professor of Horticulture, State Agricultural College; P. P. Lewis, President State Dairy Association; C. A. Morton, member State Poultry Board; S. A. Hughes, Immigration Commissioner Frisco System; B. W. Redfearn, General Dairy Agent Frisco System; W. G. Hutton, editor Farm Progress, St. Louis. Trainmaster Chas. Baltzell of Thayer was in charge of the transportation arrangements.

Upon the arrival of the train in West Plains the party was met with carriages at the Frisco depot, and taken to the Arcade Hotel. Colonel Jay L. Torrey of Fruitville, whose hospitality and reputation as an entertainer and "good fellow" has become widely known, had arranged an unique reception, what he termed a "mush and milk banquet," for the visitors and a number of citizens. Sixty-five persons gathered around the banquet table in the brilliant dining room to do homage to the gallant Colonel.

The opera house was filled when Judge W. N. Evans, who presided as chairman, called the meeting to order. Appropriate decorations were to be seen everywhere in the house. On one side of the stage was the picture of a large apple with the wording, "Land of the Big Red Apple," and on the opposite side a hen and the words, "The Home of the Helpful Hen." Many farmers braved the storm and were in the audience, which was an appreciative one.

The appearance of Dr. W. P. Cutler, State Dairy Commissioner, was the signal for a round of applause. Dr. Cutler formerly resided in Howell county, and many of his personal friends were in the audience, and some had come many miles to greet him.

"If there is one place that I wanted to get to more than any other on this trip it was West Plains," said Dr. Cutler. "I see many familiar faces in the audience, and there is a warm spot in my heart for West Plains and Howell county. If some time in the future I am compelled to give up the work in which I am now engaged, I hope that I may return to Howell county and live among her good people.

"Recently I heard that an effort is being made to get a creamery located in West Plains. I hope there will be no question about what money is necessary, and I urge all to get together and raise it. Nothing makes more business for a town than a butter factory, and it will aid more in building up the surrounding country than any other industry.

"There is every reason why Howell county is and can be a better milk producing country than Wisconsin, which has become famous as a dairy state. Here we have every advantage, and there are very few days in the year when outdoor work is uncomfortable.

"Here a milk cow can keep on the grass seven months in the year, and everyone knows that more grass means more milk. It does not require extra houses to care for cows in this country, but they must be kept in a comfortable place out of the cold in winter. Cold weather means a waste of food, for then the cows must eat to keep warm and give little milk.

"I know of a farmer in the Ozark region who has a herd of twenty cows, from which he made $6 a month to each cow last year by selling butter fat to the creamery. The skimmed milk fed to the hogs, at $9 per 100 pounds, is a pretty good price for milk. Then the cows fertilize the farm, and in two years this alone will increase the value of the farm 25 per cent."

Dr. Cutler then told of the wonderful herd of dairy cattle at the State Agricultural College. There are seventeen Jersey cows in the world, each of which made over 700 pounds of butter a year, and five of these are at Columbia. What has been done at Columbia can be done here in the Ozarks, but not with a scrub cow.

"If you get a creamery in West Plains every farmer can see just how much butter fat he gets paid for and can figure at the end of the year what his income has been from dairying. Farmers will come far and wide to get the benefit of this market, and a creamery will bring many people here. West Plains is the best town between Springfield and Jonesboro, and I hope in the spring to eat West Plains butter, and on my next visit here to go through the creamery."

Prof. C. H. Eckles, Professor of Dairy Husbandry in the State Agricultural College, made an address that was full of good thought. He is extremely gratified with the great interest taken by the people of the Ozark region in dairying.

"There are hundreds of thousands of people in St. Louis crying for milk," Prof. Eckles said, "and right here in Southern Missouri we have a region that can supply them all. There is no fear of an over-production of dairy products, as the demand exceeds the supply.

"One great advantage that the dairy cow has over anything else a farmer owns is that she gives a sure income every day and every month in the year. There is nothing special attached to her, but a steady and certain income. There are other profitable things that may be done on the farm, but let dairying go along with fruit growing and the others, and in a short time Howell county can produce more than two million dollars worth of creamery products.

"It takes time to get a good dairy herd. Pick out the good individuals, for some are born good and some inferior. The power to produce milk must be born in the animals, and this is why the farmer should have the best. There is an enormous demand for good milk cows, and this is why they are so hard to find, and you must raise them yourself.

"You must care and feed the cow well. If she gets good treatment and is fed right, then there will be good results. The secret of dairying is to know what, when and how to do it. If you have a good cow, feed her well, for it is not good policy to half feed her. It is not very expensive to keep extra good cows, even if they eat one and three-fourths as much as an inferior cow, but give five times as much milk as a scrub.

"The right kind of feed must be given the cow. Of course, the best results are obtained from the dairy herd in the early part of the summer, but the man who gets the best results keeps his cows in the same condition the year round. Every dairyman should have a silo for green food in the winter, because excellent results are obtained from feeding silo. It's certain that a cow won't produce milk unless she is fed something to produce milk from. Cowpeas, clover and alfalfa are ideal food for milk cows, while the silo for green food, some corn, and now and then a little bran or cotton seed meal, is a great help.

"The success in dairying depends largely on plenty of feed, good shelter, in winter a tight barn, where the cow can lie down, and above all, the best of stock, and you are sure of a good income. Get your creamery established in West Plains, and then the farmer has a market for his dairy products."

On February 13 to 17 the Commissioner was invited to accompany Governor Hadley and party over the lines in Southeast Missouri as far south as Kennett, and at every stop made an address was given on dairying.

A dairy meeting was held at Ironton, Missouri, on March 2; again, on April 12 and 13, at Brandsville, Koshkonong and Thayer, Missouri.

May 23 and 24 I attended the Land Congress at Ironton, delivering an address on dairying.

Beginning June 13 and ending 23 of the same month, I accompanied a party from the School of Journalism of the University on a trip, beginning at Kirksville, including Mexico, St. Louis, Springfield, Hollister, Brandsville and Koshkonong, at all of which places addresses were made on dairying. The young journalists reported each address to the metropolitan newspapers of the State. It has been found that much good has come of this publicity for the dairy interests.

On July 25 and 26 addresses were made on dairying at Fruitville and West Plains while in attendance at the peach carnival.

Dairy addresses were made on July 27 at Billings; August 16, Humphrey; August 20, at Cassville; August 23, at Rich Fountain; August 24, at Bunceton; at the Land Congress at Moberly from September 6 to 9; October 13, Mountain Grove; October 15, Lowry City and Appleton City.

From October 25 until the 28th, inclusive, a very unique train was run over the Kansas City, Clinton and Springfield Railway through the courtesy of Col. E. J. Perry, superintendent of that road, and was called the State Dairy, Poultry and Good Roads Special, the train being made up of three motor cars. The principal speakers of the occasion were T. E. Quisenberry, Secretary of the State Poultry Board; Curtis Hill, State Highway Engineer, and myself. We spoke to five thousand people in about three days, including a large number of school children. So great was the success of these meetings that the authorities of this road are expecting to repeat it in the near future.

On November 3, at the request of the Secretary of the State Board of Agriculture, I proceeded to Jameson to speak on dairying, but owing to a misunderstanding with the local authorities as to date, no address was made. The next day, however, an address on dairying was delivered at Gallatin in connection with other institute workers of this Board.

Referring to the trip over the Kansas City, Clinton and Springfield Company Railway with motor cars, it occurs to me that it would be a large measure of economy if your Board could see its way clear to purchase a motor car which could be run over the several railroads of the State. I am informed that the railroads would be very glad to give the right of way, together with a pilot to transport the speakers of your Board in their institute work, thereby saving the very large expense of railway fares. This car, I am informed, can be purchased for about five hundred dollars, and would always be the property of the Board.

On November 18, at the request of Secretary Wilson of your Board, I attended the corn show and contest at Carthage, and have to report a most remarkable meeting. The corn expert of your Board and Miss Bailey of the Home Economics Department were present, and a four days' institute was held, each of us speaking twice and sometimes three times a day on our several subjects. There were present at each meeting from two to five hundred people, including the school children of the county, and great interest was manifested, the local papers giving the meetings wide publicity. I also inspected several herds of cows. Dairying in this vicinity is very much on the increase. The member of this Board for this district rendered very active assistance to make this meeting a success.

Beginning November 28, to December 2, as Dairy Commissioner, I attended the meeting of the State and National Food and Dairy Departments at New Orleans. Missouri was honored with a place on the Executive Committee of this Association.

Respectfully,
W. P. Cutler,
Dairy Commissioner.

Farmers' Week in College of Agriculture.

January 10, 11, 12 and 13, 1911.

Eighth Annual Meeting Missouri Corn Growers' Association, Twenty-first Annual Meeting State Dairy Association, Fourth Annual Meeting Missouri Home Makers' Conference Association, Organization Meeting Women Farmers' Club, Second Annual Meeting Missouri Draft Horse Breeders' Association, Second Annual Meeting Missouri Farm Management Association, Organization Meeting Association of Missouri County Fairs, Organization Meeting Missouri Cattle Feeders' Association.

(Conducted under the auspices of the State Board of Agriculture.)

FARMERS'
WEEK
STATE BOARD
AGRICULTURE
AGRICULTURAL
COLLEGE
COLUMBIA

The greatest Farmers' Week gathering in the history of Missouri was held in the Agricultural College building of the University of Missouri at Columbia, January 10, 11, 12 and 13, 1911. Thirteen hundred Missouri farmers, representing 97 of the 114 counties of the State, were in attendance. The idea of a Missouri Farmers' Week originated with the State Board of Agriculture several years ago and the annual coming together of farmers representing the various branches of agriculture in Missouri has been of great benefit. By the several associations holding meetings at the same time and place the members of any one association not only get the good of the one, but in addition the broadening influence of all others. Last year two or three new organizations were perfected, and this year the following associations held initial meetings: Missouri Women Farmers' Club, Association of Missouri County Fairs, and Missouri Cattle Feeders' Association. Of the old associations the following held no separate meetings during the 1911 Missouri Farmers' Week:

Missouri Improved Live-Stock Breeders' Association, Missouri Jersey Breeders' Association, Missouri Swine Growers' and Breeders' Association, Missouri Sheep Breeders' Association, Missouri Saddle Horse Breeders' Association, and Missouri Highway Engineers' Association. Two of these have, for the convenience of members, held meetings elsewhere. The others either voluntarily gave their time to different associations, or were, from one cause or another, prevented from presenting their own programs.

During the four days of Farmers' Week the Agricultural College, for the second time in its history, put on a four days' short course, in which practical instruction was given in live stock judging, dairying, corn judging, poultry husbandry, horticulture, beef cutting, cooking, and dozens of other subjects in which Missouri farm men and women are interested. Throughout the week there was study and entertainment. The evening programs, presented in the main auditorium, where, with excellent music by the University band, orchestra or string quartette, and with addresses by able and entertaining men, hundreds were entertained and instructed.

On Friday night there was held the annual Agricultural College banquet, attended by Governor Herbert S. Hadley, a number of State senators and representatives, and more than 400 farmers, some with their wives, who had come to Columbia to participate in the Home Makers' Conference and the other good things of Farmers' Week. At the banquet the College champion fat steer, ''Deserter,'' furnished grand prize roast beef; Missouri Chief Josephine, the world famous milch cow, bred and owned by the Agricultural College, contributed to the supply of milk, butter and ice cream, while other good things from State farm, orchard and garden added to the plenty of the feast.

During the week the annual Missouri State Corn Show was held in the Agricultural College building. There were 350 entries, and the corn was of very superior quality. A mid-winter apple show in the Horticultural building attracted the attention of many visitors. The State Board of Horticulture had offered $300 in premiums.

The attendance for the week far exceeded that of any previous year, yet, owing largely to the excellent work of the Columbia Commercial Club, as well as to the public spirit and hospitality of the people, every visitor was provided with board and room. The State Board of Agriculture had purchased, with funds donated by the Commercial Club, 1,000 beautiful badges, as illustrated in this article. It was expected that the supply would be sufficient to meet all demands, but to the surprise and regret of all concerned the last of the badges, which were given only to visitors who registered, had been distributed before noon of the third day.

With half a dozen meetings in progress at the same time during each day of Farmers' Week, it was impossible to get complete reports, or even copies of all the leading addresses. However, an effort was made to secure a stenographer's report of the addresses made at the general opening session and at the evening meetings. In addition, the secretaries of the various associations were invited to prepare reports for publication. Such of this material as it was possible to secure will be found in following pages of this year book.

ADDRESS OF WELCOME.

(Dr. A. Ross Hill, President University of Missouri.)

Pres. A. Ross Hill.

I am delighted to welcome you. The University of Missouri is dedicated to the interests of all the people of the State, but no class of people can, in this State, be as significant in their relations to the University, or the University in its relations to them, as those representing the agricultural interests of the State. This has been well brought out by Professor Mumford in his remarks in regard to the significance of the agricultural wealth of the State and of the agricultural industry. The University, I say, as a whole is dedicated to the interests of all. Its first department established was intended to educate the youth of the State who were interested in literary lines. Then came the department for the education of teachers, and the third department established was the College of Agriculture, and the other technical schools have developed since. I am glad to be able to welcome you to the largest technical school in the University and to the best building of the University. The University is proud of the fact that it now has its best building devoted to the interests of agriculture, and we are hoping that by the time you come again, or at least by the second time you come, we will have more buildings of this type located near this where you can attend lectures, and that we shall have plenty of room for all.

I am especially interested—and I think the University as a whole must be—in the agricultural people of the State for a few special reasons: In the first place, at least one-half of the entire population of the world spend their time in the industry of cultivating the soil and rearing stock (in the State of Missouri a much larger proportion than that), and so a University that serves the interests of all the people must certainly think first of that 60 to 75 per cent of the people that are engaged in agricultural pursuits.

Furthermore, I am interested in agriculture from a solely educational standpoint, because it is the one great industry which is carried on just around the home. The home is the very center of the industry itself, and the home is essentially an educational institution. In our big manufacturing industries in the cities the home life is remote from the activities of the people, but we still in our agricultural life—and I presume for a long time it will be true—live in the midst of our work. It is not so true as it was a generation or so ago, and possibly not as true on the large farms of this State as it was in the small farming community where I grew up myself. But as I think of the farm life I can not separate it at all from the life of the home, so the agricultural industry is in its very nature an educative industry. It is not one which is carried on so much for the production of dollars as it is one which ministers from day to day—even from hour to hour—to the home comforts and the home life of the family. This constitutes, I think, the greatest industry, even if it did not produce more wealth than industries of the State.

Furthermore, the conditions of life on the farm are such as to encourage, and in fact to demand, that initiative and that feeling of independence on which rests the very foundation of our democratic institutions; and so an agricultural community has a better opportunity than any other sort of community for the maintenance of democratic ideals and democratic institutions. A university must be devoted to the raising of the standard of intelligence so that every one whom it is serving will be fit to guide his own life, to contribute to the success of democratic institutions, and therefore the University becomes interested in having the Agricultural College, which is training those who are to engage in the calling upon which rests our food supply and fosters the very ideals of our lives in this country.

And I want to call your attention also to the fact that the business of farming rests upon the laws of Nature, and that therefore there is practically no limit to the improvement possible in it; and the university which is devoted to investigations in science and the improvement of industries finds in the agricultural industry the greatest possible outlook for the future because we can conceive of no limit to the effectiveness of our work. The soil, of course, may in a measure become exhausted if recklessly used, but properly husbanded, with scientific laws applied to the operations upon it, there is no limit to the possibilities. And so you represent an industry that faces virtually an infinite future, and the University looks naturally upon the agricultural people of the State as the people that it must primarily serve so far as instruction to others than students is concerned, and upon the agricultural industry of the State as that industry through which it can accomplish its greatest results for mankind. This business of farming, too, must be a permanent one—it is nothing that will expire with this generation or the next, but must remain for all time the great industry of the people of the earth, because we will always be in need of food, and the food supply must come from the soil directly or indirectly.

There is, furthermore, it seems to me, a phase of agriculture which we do not often enough think about, and one in which a university as an educational institution is naturally greatly interested, and that is its *public* interest. It is of course important that every farmer make his farming profitable and accumulate wealth for himself, but the whole race is interested in the production of food, and therefore the State, the nation and the world is interested greatly in the advancement of the farmer and in the effectiveness of his work. I say it therefore has not only a private but a public interest to an extent not true of any other industry; and the university that serves the public must naturally, therefore, think first of the farming industry, which, because of its production of food to support the people, and because of its permanency, is the great industry for all time.

While thinking, then, of welcoming you, I do it as I reflect upon it with a greater interest and enthusiasm because you represent this industry that I have referred to.

If I may be permitted a word or two more, I would like to suggest that there are certain things which I hope will be accomplished in the agricultural industry of this State, and I will take just a moment to refer to some of these—things that I hope our College of Agriculture and University may help you and others to accomplish. As I have already remarked, the first consideration must be to make farming profitable, and it is the hope of our Agricultural College that it can render service in that connection, not only by the instruction given here to the boys who take the long or the short course, or to the farmers who gather here in conventions like this to get the results of our experiments and investigations, but also by extension work and experiments carried on all over the State it is hoped we can help to make farming more profitable.

But it is hoped also we can make it more permanent. If the industry is to be permanently successful, there is need of using greater wisdom, greater insight and skill in the execution of the tasks about the farm than in any other industry. The permanency of the raw material, so to speak—the natural resources with which you deal, rests in your hands. It rests not alone in your hands, but in the hands of everyone who is engaged in the tilling of the land, and if the Agricultural College can do anything to make your profession permanently successful, as it must be a permanent business, it stands ready to serve you; so does every other department of the University.

Something needs to be done in order to make farming permanent. It has never yet been made permanent in the true sense, and if we are not to go the way of other nations it rests with us in America to do something to make farming a permanent occupation by the skill and knowledge we put into it.

I think, too, that it needs to be made a more comfortable and pleasant occupation. When I return to my old home in the country and find all the men of my age have left the community and gone to the cities where many of them are barely eking out an existence, having been attracted there by the modern conveniences—street cars, automobiles, lights, etc., I am reminded that something must have been wrong in the comforts and pleasures that came to them in their country life, and they were attracted by those things in the city life that, so far as their essential elements are concerned, can be reproduced in the country. We are making progress, but have a long way yet to go in order to make the average life on the farm as comfortable as it might be, and in this connection I want to say it seems that we have not tried to make the farm home equal in facilities to the farm itself—that is to say, we have spent more on our reapers and plows and farm implements that we use in tilling the farm more successfully than we have upon the facilities that would make a house beautiful or comfortable, and I am glad to know that among those I can welcome this morning are the wives of Missouri farmers who come here in order that during Farmers' Week we may consider problems affecting the life of the kitchen or of the dining or the drawing room, as well as those of the stable and the field.

Then, too, it seems to me if we are to make our agricultural life a permanent, profitable and happy life, we need to have better educated farmers. Now, I know there is only one end at which we can begin if we are to have a thoroughly educated people living in the country—we must begin with the child rather than with the adult; and I look forward to a time in this State when we shall have a good school devoted to the needs of young men and women who are to spend their lives on the farm, and in such close proximity to the farm homes that everybody in the country will be able to secure not only an elementary, but a high school education. That type of school I look forward to is not a copy of the city school, but a school that is thoroughly democratic and that serves the interests of all classes—not particularly an agricultural school because there are some boys on the farms who may not have a taste for the farm life, and then from the farm we must have recruits for the clergy, for teaching and other professions, and therefore the sort of school needed in the country is one that will serve the interests of all classes, more extensive in its course of study than the school in the town, affording to the people of the country facilities for the study of all those things the town people study, and in addition opportunities for improving knowledge about farm life while attending school. To let a boy study in school for three or four years without any opportunity to study the activities of the farm is practically to insure the fact that he will not return to the farm, and we must correct that condition, and in establishing these rural high schools all over Missouri see to it that we establish schools in which our sons and daughters can get not only English and Latin, but Home Economics, Agriculture and such work; and let us not be as narrow as the city people have been and give to them the opportunity to get only an agricultural education as the city furnishes only a literary education, but let us take wisdom from the history of the past and make these schools well rounded, democratic, and adapted to all sorts of people and all interests, because those who live in the country represent all these interests. I might mention in this connection the fact that there isn't a state university anywhere in this country that does not draw almost its entire faculty from the country. Nearly all the professors of this university were born and reared in the country, but all had to leave their homes in order to get anything more than the mere rudiments of an education, and those of us who have drifted away from the agricultural profession might be engaged in that work today if we had had the proper opportunities at the proper time. I have often remarked to my friends who are engaged in teaching agriculture that I am sure I would be with them now if I had ever heard of an agricultural college while I was attending country school. But such a thing was not conceived of as possible—it was beyond all conception, and so there was no opportunity for us to get an agricultural education.

I welcome you, then, who come here to consider the problems affecting your life in the county districts. I want to say that I think the badges that some of our boys are wearing this week show the correct attitude; it is not show me but *ask* me. That is the attitude we take here this week, and we shall be glad to do anything we can to furnish you any facilities within our power. I welcome you not only to the College of Agriculture but to the University as a whole, because I think the other departments are also worth while. We are carrying on experiments in the Engineering Department which will be of benefit to the farmers of the State, having published last year a bulletin on the use of acetylene gas for country homes and one on farm sanitation, etc.—things which help to make life on the farm more comfortable and convenient. And so we welcome you to the entire university. Every occasion like this gives us an opportunity to renew the life of the institution, and every time you gather here the University of Missouri girds itself afresh for the tasks that lie before her.

ADDRESS OF WELCOME.

(F. B. Mumford, Dean of the College of Agriculture.)

Dean F. B. Mumford.

The College of Agriculture is, in a peculiar sense, glad to see you. We are glad to see you because of all the farmers' organizations that meet in Missouri this is unquestionably the most important. It is the most representative body of farmers that meets in the State of Missouri, and perhaps in any other state in the United States. It represents not only the farmers in an unorganized way, but there are meeting here this week all of the important State Agricultural Associations. We are glad to welcome you to the College of Agriculture, because this is the most representative body of farmers in the State. You represent unquestionably the greatest industry in this country, and in Missouri particularly the agricultural industry exceeds in importance all others.

We are glad to welcome you here also because the agricultural industry is a fundamental industry. In the promotion of agriculture we are promoting an industry which is not in competition with any other industry, but which lies at the very foundation of the development of every other industry of the American nation.

The students of the College of Agriculture this year are particularly glad to have you come because we have had in the past year a noticeable development. For the first time in the history of the University the enrollment in the College of Agriculture has become the largest of any professional school or college in the institution. It is now by far the largest professional school in the University, and is second only to the College of Arts in the number of students which it enrolls. If we include those enrolled in the Farmers' Short Course, the College of Agriculture has given instruction in agriculture to 2,100 persons during the current year. Of this number more than 1,700 will manage or perform labor on Missouri farms in 1911. The College is doing its full share in redirecting the trend of population to the open country. It is not true that the College of Agriculture is educating men away from the farm. It is hardly necessary for me to say to you, moreover, that we are glad to have you here because we feel that we have accomplished a few things during the past year that meet with your approval. The remarkable development of the cows in our dairy department is a matter familiar to all of you, and it is with some pride that we point to the fact that in an agricultural college organized for the promotion of teaching agriculture we have been able also to produce in Missouri Chief Josephine, the best cow that the world has so far known.

I am also pleased at this time to be able to call your attention to the remarkable victory of our judging team in Chicago—a victory not only for the College of Agriculture, but for your sons, because these boys represent widely separated districts in Missouri.

The limits of our time this morning forbid me any extended discussion of the College of Agriculture and its significance as an educational institution, but you will perhaps permit me to say that the agricultural colleges of this country represent a most remarkable educational achievement. I think it is correct to say that no type of education has ever succeeded in organizing in so short a time such a body of systematic facts and developing a course of instruction so efficient and so popular among its patrons.

To my mind, there are very good reasons for this development. The agricultural colleges have always recognized the fact that fundamental to instruction was the acquisition of knowledge, and hand in hand with the instruction has been carried on the work of the Experiment Station. Fundamental research has been co-extensive with good teaching. The Agricultural College has started out to investigate problems of the farm, then to solve them, and then to teach the results of those experiments.

But the College of Agriculture has not been satisfied to teach at the College and to investigate at the College. Agricultural colleges, more than any other organized educational institutions, have felt the need of the extension of the knowledge acquired to the people themselves; and I want to say to you that the enrollment of 675 students in the Agricultural College does not represent the enrollment of students in the Missouri College of Agriculture. We believe we have a body of students located all over the State of Missouri who are as truly studying under our guidance the great fundamental facts of production as are the students here enrolled. Thousands of people are now willing and anxious to take advantage of the results which have been secured in our investigations here at the Missouri College of Agriculture, and as the result of the encouragement it has had on the part of the present Board of Curators, and the present President of the University, a great deal has been accomplished in this line during the past year.

I want to emphasize the fact that the College of Agriculture is doing some work outside of Columbia for the farmers of Missouri, and it has accomplished this so far, let me say, without any special appropriation for this work. During the past year the men from the College of Agriculture have delivered 460 public addresses outside of Columbia at various points in the State. The correspondence of the men in the College of Agriculture has reached the annual total of 40,000 letters, and most of these require personal answers. The Station has published 22 bulletins during the year, and these 22 bulletins have contained four million pages of printed matter. It was at this Station, perhaps, that the most complete work in the inoculation of hogs for hog cholera has been done, and as a result of the perfection of that treatment the Veterinary Department has inoculated during the past year 50,000 hogs and saved 80 to 85 per cent from death. This is a saving of more than a half million dollars a year to the farmers of Missouri.

Our men have judged at 42 live stock and 67 corn shows in the State. There were in attendance upon those exhibitions more than 450,000 people. We have organized 16 outlying experiment farms. The farmer sometimes tells us when we attempt to advise him as to methods of farming—"Oh well, that will probably work up there in Columbia where you have the State behind you and a large farm and all modern conveniences, but it won't work out here." Fortunately, at the present time we are often able to say to that farmer, "We have an outlying experiment field about two miles from your farm in which we have worked out that particular problem, and if you will go over there you will see what has been accomplished." We have organized 360 farmers in a co-operative Experiment Association, carrying on experiments in better methods of farming directly with the farmer. We have covered the State with out fertilizer inspection, and you are safe in purchasing commercial fertilizers in Missouri today, because the Experiment Station inspects every brand of fertilizer sold in the State and sees to it that the manufacturer's guarantee is correct. No firm can do business in this

State that does not sell fertilizer according to its guarantee, and that is because of the work of the Experiment Station.

I wish in closing to again welcome you to the College of Agriculture, and to express to you the hope that we will be able to carry on this Farmers' Week in a way that shall be pleasant and instructive to you.

ADDRESS OF WELCOME.

(T. C. Wilson, Secretary Board of Agriculture.)

Sec. T. C. Wilson.

The part that I am called upon to fill at this time is both embarrassing and painful. It is always embarrassing for me to attempt to address an audience, especially when that audience exceeds one person. My task today becomes a painful one by reason of the fact that I am here to represent one whom we all know and all love to honor—one who has for half a century been a leader in agriculture, a preacher and practitioner of modern methods, one whose splendid insight into a far-flung future blazed the way for a fuller farm life, not only in Missouri, but throughout the nation—Hon. Norman J. Colman.

Governor Colman's place on the program seems peculiarly appropriate for the reason that he has served almost continuously on the Board since 1865. All of us are grieved to know that Mr. Colman's physical condition is such as to preclude his presence here today, and all join in a sincere hope for his speedy recovery, and a still greater lengthening of his long and useful life.

It is much to your good fortune that we have in reserve for this occasion speakers whom you will be delighted to hear. In extending to you a very heartly welcome on behalf of the State Board of Agriculture, I shall not take much time—not if my task is to be measured in length by the time given me for preparation.

We welcome you on this ''Farmers Week'' occasion. The whole time is yours; the whole town is yours. Most of you come bringing with you the hope, knowledge and cheer of field and farm—the workshop and the storehouse of the nation, the source of our prosperity and the promise of our perpetuity. We welcome you as the tried and true representatives of the highest type of our national life. We welcome you as the personification of all that is purest and loveliest in the treasure house of childhood's memories. For there is no memory half so sweet to an honest man as those of childhood's days, if they were spent on a farm. You have come from the four corners of the State and from every center of this agricultural universe, but all of you have come with a single object in view—the acquisition of knowledge. We welcome you to this great educational center where men and women are being fitted for the higher spheres of life, and we hope and believe that you will take with you, when you return to your homes, some added knowledge, some stimulating incentive for good. May we not hope that each of you will have a helpful message for your friend and neighbor who is not here.

Lack of time forbids more than a very brief mention of the work of the Board of Agriculture under whose auspices, the College of Agriculture co-operating, the Farmers' Week exercises are held.

This Board, organized in 1865, and composed of 16 practical farmers and three ex officio members—the Governor, Dean of the Agricultural College and State Superintendent of Schools—is an institution of, for and by Missouri farmers. Its aim is to aid in the development and upbuilding of all lines of crop growing and live stock husbandry. So many and varied are its diverging lines of activity that it is impossible to enumerate them all. The office of the Secretary of the State Board of Agriculture is not a "wisdom factory," but rather a "clearing house" for agricultural ideas. More time is spent in gathering information than in giving it out. Were this not true, we would soon tell all we know as well as all that we know the other fellow knows. Bulletins from the National Department of Agriculture are read and "boiled down" for further use. But the most valuable, practical and highly prized information received by the Board comes from those whom it seeks to serve—from the Missouri farmers themselves. Each month the Board issues a bulletin on some timely topic. Almost without exception the bulletins most in demand are those prepared in largest part by the people.

It is literally true that our Board is called upon to answer 10,000 questions within a year. These questions deal with almost every phase of farm life. Most of them we are able to answer. Some of a strictly technical nature are referred to the proper department in the Agricultural College.

Each year the Board issues an Annual Report, which is really an Agricultural Year Book of some 500 pages. The 10,000 copies are entirely inadequate to meet the demand, which has already exceeded 20,000 for the last publication. Four advertising booklets calling attention to the matchless resources of Missouri have also been issued. These booklets, we believe, have helped make the Missouri farmer who has been looking longingly to other lands direct his visions to sections nearer home.

Each month during the growing season the Board issues a crop report, and at the close of the year a summary of the year's yield.

But the most important work of the Board is the holding of some 300 farmers' institutes each year—institutes which may take the form of special agricultural trains, farm boys' encampments, or even a great Farmers' Week meeting, such as this promises to be. Where the Board once had to hunt places to hold institutes—where it was safe for a, at that time, so-called "book farmer" to "light," we are today looking, not for places where we may hold meetings, but for men and means to carry on the work, for which, from every section of the State, the people are calling.

This is the day and hour of the greatest agricultural awakening the world has ever known. Such meetings as this prove it. Not idle curiosity, but a desire for knowledge and an interest in your work, has brought you here for this great mid-winter meeting—an agricultural short course and a farmers' congress combined.

That you may enjoy the week and that it may prove profitable to you and to the State is our wish, coupled with a thousand unspoken but heartfelt words of welcome.

ADDRESS OF WELCOME ON BEHALF OF COMMERCIAL CLUB OF COLUMBIA.

(Hon. N. T. Gentry, Columbia, Mo.)

Mr. President, Ladies and Gentlemen:

As a citizen of Columbia, I have been selected to formally welcome the farmers of the State, and I am sure that I do so with pleasure. We have been honored by you with visits to our little city on former occasions, and we sincerely desire to see you in our midst again and again.

Hon. N. T. Gentry.

It is appropriate that the farmers of Missouri should hold their meetings in Columbia, because Columbia is located in Central Missouri, and we Central Missourians think that Central Missouri is one of the best farming districts in our State and in our Nation. The people of Boone county, and the counties adjoining, are proud of what their farmers have done—the fine horses they have raised, fat cattle, big mules, high priced hogs and elegant sheep and poultry, besides their extra good crops of hay, corn, wheat, oats, fruit and vegetables. But above all, our counties are proud of the boys and girls, the men and the women, who have been raised on our farms, and the work that they have accomplished and are now accomplishing for society. We are proud of those who have left the farms and moved to the towns and cities, because they have made some of the best citizens in our towns and cities; and we are also proud of those who have stayed on the farms, for we realize that they are the making of Missouri.

It is appropriate that you should hold your meeting in Columbia, because the Missouri Agricultural College is located in our city. All Misourians have good reason for being proud of that institution, for we believe that the work that is there being done is of the greatest importance to the farmers of the State. We are glad that the farmers are beginning to realize that our Agricultural College was established by the General Assembly of Missouri in 1870 for the benefit of the farmers, and that it can be of great benefit to all of the farmers of the State. I have been introduced to you as a graduate of the Agricultural College, which is true; hence I personally know something of the value of the work of that deparment. I graduated in 1884, at a time when there were five students in that department, and the department was considered something of a joke by those not familiar with it. But today, under the leadership of our distinguished President, Dr. Hill, and the Dean of the Department, Prof. Mumford, and the other members of the faculty, there are now enrolled six hundred and fifty students in that department, and it is considered one of the greatest departments in our University. Although I graduated as a farmer, I did not become a practicing farmer. However, I married a farmer; so you see, gentlemen, I have always had respect for and patience with the farmers. As a lawyer, I have been glad when I had a jury composed of farmers, especially if my client was on the right side, because I have learned that farmers want to do what is right, and will do it, if they only know what is right.

And it is appropriate that this meeting should be held in Columbia, because here in Columbia one of the gentlemen connected with the Agricultural College perfected the hog cholera cure; and Columbia is the home of the great cow, Josephine, the greatest dairy cow in the world.

We are glad to have you in Columbia, ladies and gentlemen, and glad to have you learn more about our Agricultural College. I realize that this gathering represents the progressive and the educated farmers of our State. You come here seeking information on various subjects, some of you come at a sacrifice, and many of you come at great inconvenience. We hope that the information that you here receive from the leading agriculturists of the State and of the nation will be carried by you to your various homes, and disseminated by you throughout the State; and that all of our farmers will be greatly benefited by these meetings, and that all of the farmers will soon recognize the value of these annual meetings. While you are here, we want you to visit every department of our State University. All Missourians should be proud of our State University—proud that we have a State University, and proud of what it is and has been for the boys and girls of old Missouri. We want you to learn the song, ''Old Missouri,'' and sing it in your homes, on the farm, in the villages and at the cross roads. We want you to talk the University so much that every boy and every girl in Missouri will long to attend this institution. In every home in our State there should be at least one graduate of one of the departments of the Missouri State University. When the farmers of our State appreciate the value of our great University it will then receive that support, moral and financial, which it should receive, and which will enable it to become what it should be—the greatest educational institution in our great West.

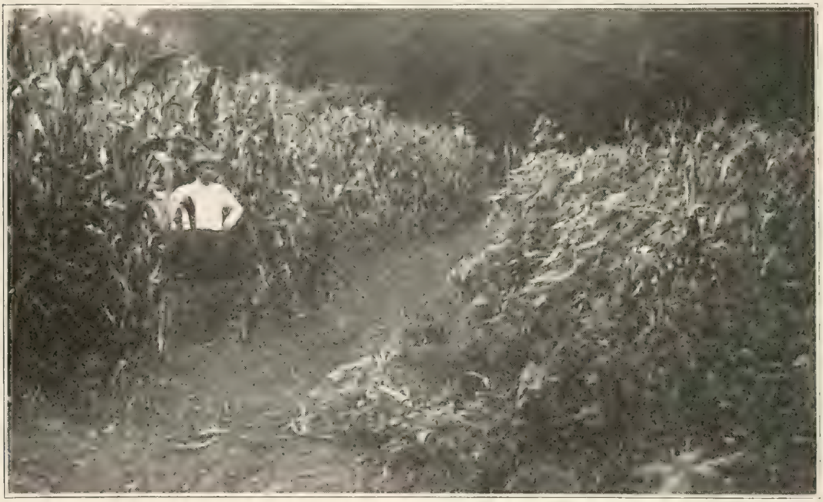
We, therefore, welcome you to our town and to our homes, to our University and your University, to our Agricultural College and your Agricultural College; and we trust that your meeting here will be so pleasant and so profitable that you will make Columbia your permanent meeting place. Ladies and gentlemen, the town is yours—we are glad to see you here.

WHAT CAN BE DONE ON TWENTY ACRES.

(Arnold Martin, Dubois, Nebraska, at Missouri Farmers' Week.)

I came into this country a few years ago, having spent my early boyhood on a six-acre farm in Switzerland among the foot-hills which are along the River Rhine. My life was spent on the small farm. I had the advantage of taking an agricultural education in the public school and the county high school, besides a practical home training which, in my mind, did me more good than anything else. The oldest among ten children in our family, I was taught self-support when I was twelve years old. After our six-acre farm was worked I was allowed to find work among the neighbors, and what I earned was my spending money to get my clothing and to lay away for the future. In six years I was able to accumulate $68. My first bank account started with three dollars. My best wages were 50 cents a day and my board. I was always taught that the ownership of a piece of land was a mark of honor, and when I was 17 years of age I had in mind to invest my small savings in a small tract of land—about one-half acre.

During my school days we studied the history and resources of other nations, and it looked to me that "Uncle Sam" had about the best offering to make for any young man willing to try to help himself. I took my six years' earnings and bought a ticket to Kansas, where I landed without a penny. As I looked over those broad fields and prairies, where I was unable to find a stone on 40 or even on 80 acres, I could see the opportunity for a young man in a few years to live an independent, healthful and progressive life. After working out a number of years among German farmers I saw the waste that existed and learned the ups and downs of the extensive farming system. I learned that the large farmer has not much time to observe. Land that is today selling for from $100 to $150 an acre was worth from $25 to $40 when I came here. The crops are not much better on some farms. The reason for this is in farming too much land. The land doesn't pay a profit as it should on $100 land. It was all right to farm the land when it was worth $25 to $40. In years past the improved machinery has proven itself very valuable in the raising of all kinds of crops. It enables a man to go over a larger piece of land than in former years, but this doesn't always make the land any better. Average crops have never paid in the past, they do not pay at present, nor will they in the future. Some farmers place no value upon their own time. The man that runs a factory does



Mr. Martin standing in his corn field which has withstood seven weeks of drouth. Opposite is another field in which the same kind of seed was planted at the same time, but the cultivation was different.

differently. It is not the number of acres and average crops that make the money. It is the proper care those acres are receiving and at the right time. That is where the small farmer has the advantage over the large farmer. Hired labor is getting more scarce every year. Six counties in the First Congressional district of Southeastern Nebraska lost very heavily in population the last few years. My own county lost over 1,200. What is the cause? My own neighborhood tells the story. We have read and have been told of people leaving the farm in years past on account of poor schools in the country, poor roads, lack of churches, and many other causes. Make the country attractive, it was said, and even the city bred people would turn to the country. Of late years we have received rural free mail delivery and telephone service. What is the cause of the people leaving my neighborhood and selling their 40 and 80-acre farms? I never heard them complain about the poor roads, schools or churches. They pull up their stakes and move on to cheaper land. The big fellows have been buying out the little fellows. Land was the safest place to invest their money and churches, schools and roads were not always considered. Land was what they wanted; each one wanted a little more. As those little farmers moving away, the hired help getting scarcer, land owners moving to town, the land getting in the hands of renters—forty-six per cent of the land in Southeastern Nebraska is in rented farms, 90 per cent on a one-year lease. This is a bad system. The landlord lives in town with the excuse of educating his children and claims that country schools are not what they should be. I would rather see some of those landlords out in the country wearing out their lives than rusting out in town.

That brings up the question of landlord and renters which we had on the program at our State Meeting during Farmers' Week last winter at Lincoln, Nebraska. The landlords were well represented and made their pleas and told how they were getting along with their renters and what the renters should do. I was called upon to give my opinion, and told them I had nothing to say that would be in favor of a landlord. I rented for three years and was not encouraged any longer to be a renter, so I bought a home for myself in order that I might live independently under my own ''vine and fig tree,'' and I would encourage every renter to do likewise. Again, we have no back history to draw from to offer a remedy that would work out satisfactorily for both parties. Our country life prophets should bring forward a different remedy in order to keep the people on our rich corn belt land. A remedy must be brought that will cause a breaking down of land holding, now too large, so that there may be provided more homes in the country for farmers, and young and old must be more broadly educated as to how to till the soil to get more out of an acre by additional labor.

Working out a number of years among farmers, I began renting 80 acres for $250 cash rent, boarded with the landlord on the same farm, and made enough ahead after my expenses were paid to spend three months in school during the winter. In the spring I went back to Switzerland and invested my earnings in three small plats of land and farmed intensively one season with good success. Next season I came back again to Kansas, where a friend rented me 120 acres of land, giving half in grain, he reserving stalk field and straw. I sold the oats from 12 acres at 12 cents per bushel and had $10 left after all expenses were paid. The corn brought 17 cents a bushel. In those two years I accumulated $275, and was ready then to leave the place because one of his sons wanted it. The best I could find was 80 acres to rent at $225 cash in advance, and the landlord wanted to live in the same house. Well, I drove 18 miles to see the 80 acres. I found 20 acres of unimproved land in Pawnee, Nebraska. This 20 acres was originally sold off from a farm because of its extreme roughness and undesirableness for American agriculture, as it was coal land. When the coal was worked out it was an undesirable piece of property and was sold to me by the owner for $12.50 per acre when land adjoining sold for from $70 to $80. Half of the land was covered with small trees and hazelbrush, with a small branch running across it. One bank of the stream was a high, steep bluff with limestone cropping.

This rough land did not look rough to me after having been brought up in a mountainous country like Switzerland. A small cottage was built on the hill side. It was not large at first, being 12 by 16 feet, but it was a happy home to start with. As soon as I moved in I lost no time in clearing up some of the brush land and planted three acres in potatoes. They brought $339, besides a crop of corn between the rows. While I was grubbing out the trees and getting the land ready for crops I was studying the crops I would grow and the home market. All that was suitable for tillage was made fertile by hundreds of loads of manure drawn from a small town near by. The crops consisted of potatoes, onions, small fruits, pears and peaches. Poultry was also added to the farm and kept in yards some of the time during the growing season. One team was kept, two cows, and a few hogs sold each year. When I bought the place I was the laughing stock of the average people. They would say, "What is that man going to do on that piece of land—he will starve to death." When I was grubbing out those hazelbrush in order to plant some profitable crops in their place, I was called "Hazelbrush

Martin.'' My early training I had received at home among the rocks and bluffs to find a living out of those old hillsides where the Romans used to farm 2,000 years ago, became very helpful to me to turn this 20 acres into a profitable home. The more the people talked about it the harder I worked and made it what it is today, and it is not finished yet, for ''Home is what we make it.'' No man need to be ashamed to start low. There is always plenty of room on top. Before rural life can be held in the highest honor, farmers and their children must be more broadly educated. Labor, no matter what or where it is, must be held in honor. The hoe in the field and the family garden, the shovel on the highway, the rake and the harrow in the field are all implements of honorable and profitable industry. The impression that working in the soil on the farm is degrading, and that it is more honorable to live in the city and find employment is a wrong doctrine to preach on the farm. Young men and old men, get your feet upon the soil instead of on a wooden floor in shops, and draw from the soil not only wealth but health, and the joy of the earth, not only a living but life. Earth is your mother; honor her that your days may be long in this great land of ours. To make a small farm profitable a man has got to have a good knowledge of the soil and plant in that soil what is best adapted to it, that which brings you the most dollars and cents and robs the ground least of its fertility. The more intensive the system of farming carried on the more necessary the experience becomes. I have received many letters

Pear orchard at blooming time on the 20-acre farm.

from men in all walks of life, and the tone of their letters tells me that the hunger for land and a self-supporting home is inherent in every right-minded man, and that the natural place for men to live is in the country. City life at its best is an artificial one.

The farmer certainly has the best of it. He may work hard some of the time, but it brings direct returns. With the right kind of management, the small farmer doesn't depend entirely on the butcher and the baker and the groceryman for the necessities of life. He can produce an abundance of vegetables and fruit, and he can have eggs and poultry the year around without considering those things a luxury. A few hogs keep him supplied with lard and pork. The orchards will supply him with apples of many varieties, summer, fall and winter. Pumpkins, squashes, piles of potatoes and turnips may be stored in the cellar for winter use and buried out doors for spring use. Then the housewife has her rows of jars of jellies and preserves, and no one needs to worry about fruit the long winter days. Compare this country life with the city man's side; I mean the laboring man, the man who works for wages. We all know prosperous times make high prices. He pays enough for all he receives. In times of strikes and business depression he has nothing to fall back on. On the other hand, the man who has a farm, even of small acres, has something back of him when all other support fails.

Let me tell you what can be done on one acre of vegetables on a small farm in Southeastern Nebraska. I want to say at the same time no man can tell the limit of what one acre of land can do if it is handled rightly and there is a market for it and transportation is reasonable. The garden and the poultry yard are the two places on the average farm and even on many city lots where the table may be supplied without going to the stores and hand out the hard cash for a second class article. This year, owing to the dry spring, early garden stuff was a rare thing on many family tables.

My first planting of garden seeds began by the first week of March. It was all fall plowed ground. In the past seven years manure was hauled upon it and it was made as rich as possible. The weeds were kept down every year. Before planting any seed this ground was disked and harrowed with a brush harrow. With my drill I can plant any kind of garden seed in a short time, having a wheel at the back of the drill that presses the soil down on the seed. To grow more than one crop on the same piece of ground in one season, I plant two or three different kinds of seed in the same row on the same day. With lettuce I mix parsley; the next row lettuce with carrots; next lettuce with rutabagas; next lettuce with early turnips. Radishes and parsnips were put in another row; early table beets with parsnips in the next row; onion seed were drilled in 14 inches apart at the rate of four pounds of seed to the acre for large onions. Owing to the early planting and the working of the soil the seed came up quickly. I stirred the soil often between the rows. Radishes and lettuce began to be large enough to use by April 21, and to sell on the market. We fed lettuce to our young poultry and chickens, which were kept in yards. The latter part of May early turnips went to market and tomato seeds were dropped in their places. Cucumbers and melons also work well. The carrots grow faster sown with lettuce than when sown alone. Table beets were ready with the early turnips to market. The parsnips sown with beets were as large as when sown alone and often better. My early peas sown in March, 16 inches in the rows, were ready for use by June 5. Then the early potatoes and peas were ready to market. Where the peas grew turnip seed was sown, and later on I planted it to popcorn in the row.

Vegetable growing on Mr. Martin's 20-acre farm.

I plant onion seeds in March, and by the first of June I plant popcorn with the onions every sixth row. By the first of August those onions are ripe and are ready to pull, and they can be pulled and cured partly shaded. Then by the middle of August the popcorn is ripe, the onions and the corn are removed, and the land sown to late turnips for winter use. While with rainfall the last two crops are cheap ones, they are extras for the season. After the crops are removed the ground should be fall-plowed to allow the frost to pulverize it. At the same time we must not forget to feed the soil. Last spring 50 bushels of chicken manure was put on one-fourth of an acre—that will be plenty to grow any kind of vegetables for the next two years. Potatoes were also planted on the hill side, beginning on the tenth of March. They froze down during the cold snap after being up. I gave them good care after the freeze and they came right on again. Among the trees in the orchards, where smudge piles were burning all night, the trees got through all right. I planted popcorn between the rows. From the second to the fifteenth of June, for two weeks, I market early potatoes at 3½ cents per pound. Among the rest of the potatoes German millet was sown before the last time of plowing. The latter part of May we got good rains. After the millet got up both crops got along well. By the 10th of July the potato was made and the millet was ready to cut August 15th and taken off the ground. The potatoes were harvested after the millet was removed. The ground was double disked and ready to be sown to alfalfa by September 1. Those potatoes came in competition in state and interstate shows and were winners wherever they went. Last season I conducted a variety ''race'' of 18 varieties, early and late potatoes, with two applications of nitrate of soda. A ten days' to two weeks' earlier market in potatoes at 3½ cents per pound is a good investment. I find nitrate of soda benefits all crops, but it does not pay to use it on all crops. Its cost makes it unprofitable on cheap crops. Such crops as early potatoes, turnips, table beets and tomatoes, to be profitable, must be forced as much as possible to get them in the early market when the prices are high, and $5 spent in nitrate of soda makes from $20 to $30 profit, and it takes no more labor nor land.

To my mind, the most unfavorable seasons are the most educating ones and the most profitable ones for the small farmer, provided he doesn't keep his eggs all in one basket. To secure the best results the small farmer must diversify his crops. He must have an income from a variety of crops, because a single crop may fail in some years to meet a good market. Growing many crops of fruit, vegetables, grain and grasses he must have a broader knowledge in the management of all soils and have no waste spot on his farm. While the small farmer successfully solves the problems on his own farm his experience becomes broader, naturally makes him a broader man, and as he broadens he takes his children into partnership in the work and they become broader in doing common, useful work that will be a great advantage to them in their future life.

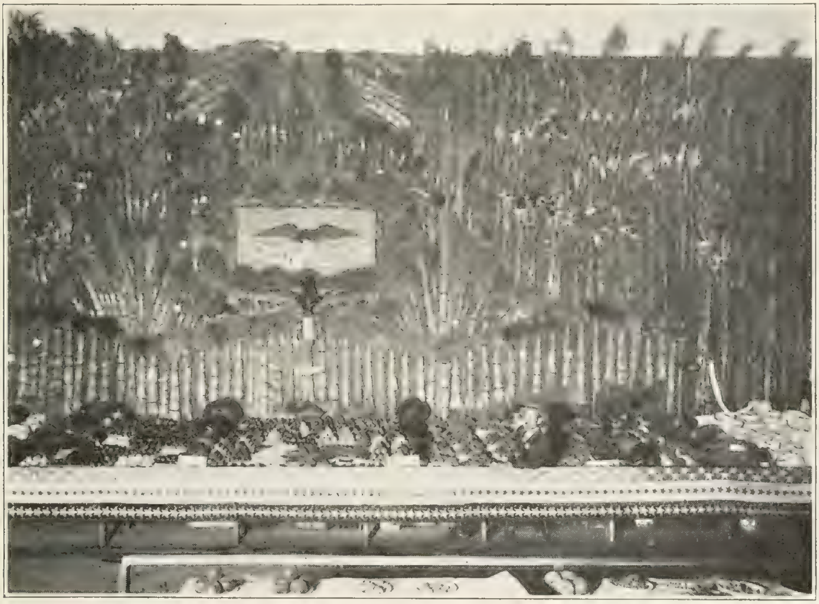
The one crop system with no rotation is harmful to the extensive farmer, but all the more so for the intensive farmer. The more intensive the system the more necessary experience becomes. The getting of this experience comes from doing the work ourselves every day in the field, orchard or garden. To my mind, no book nor paper can be written on farming that will answer for all soils and sections in all seasons. No two sections, soils nor seasons are alike. The dry years and dry spells will return after the wet seasons. This has been true through all ages and will be in the future. The longer you and I stay on the farms which we call our homes the better for the farm and future generations. I know by experience that plenty of manure worked into soil and the most complete system of cultivation make an almost complete protection against ordinary drought. I will admit the seasons have much to do in the making of all our crops, but in some cases the farmer has certain control over elements such as water, air and heat. Of late years we are beginning to realize that if the soil is cultivated carefully and intensively it will hold water within itself and carries a storage reservoir underneath the growing plants.

After a heavy rain the atmosphere will drink up the moisture from the soil unless we prevent it by the means that we call a soil blanket or mulch. That is true also in the irrigated region. The successful irrigator believes in cultivation, and will get along with less water and often better results. I do believe the last ten years the wet seasons have done more harm to the average farmer's cornfield than the drought. The dry years are always the most profitable ones for the small farmer; for the large farmer, the most disastrous ones. No one need to think that the profit comes from the land in a dry season to the cultivator without steady work. No owner of land, unless others require it to live upon, can make money by neglecting it. The cultivator and the hoe in the hand of a scientific farmer will bring as good and better results in providing moisture for the growing plants as can be had from a ditch in the hand of an ignorant farmer. Not every one will succeed in farming if taken up from a labor side. He ought to know the whys and wherefores, the causes and effects. There is no use in blaming people for not leaving the cities to go to the farms: 1st, some of them don't know enough to go; 2nd, they don't know enough to make a living if they did go; 3rd, some of them don't know enough to enjoy it; 4th, many of them have not the capital. We must teach them first. Where children are taught what to do with the earth and how to do it, it is worth whole shelves of books.

To my mind, there is no scarcity of land to feed the nation and its people, even at the wasteful rate. The saying that there are too many mouths to be fed by the world's supply is the kind of gospel spread by the speculator and the monopolist. The yielding capacity of our land in this great corn belt has never been tested by the average farmer. Someone has said that we have no soil that is really barren or worthless to the man who knows how to bring the soil and the right plant together. I have made many travels in this country in all directions, and have been back to my native land three times, taking different routes through Germany and France. They have no barren acres. Every foot is producing something. The average farmer of the corn belt is working hard and depriving himself of needed rest. Why? He wishes to raise more corn to buy more land. In this circle he moves on until the Almighty stops his hoggish proceedings. It looks more like speculation than farming. The last census is an eye opener to the people in this rich corn belt land. Where is this kind of farming or speculation leading to? It operates today against keeping the boys in the country. They have not got money enough to buy large farms. The boy wants to start in where "the old man" leaves off. Absorbing farms into still larger farms causes the loss of population in rural districts. Many are learning that the small farm near the town is the money maker, but in some towns it may be overdone unless there are some factories. To make small farms pay the producer and consumer must not be too far apart, or the transportation rates will eat up the profit. Many have to take up renting, moving one year after another under one year leases, and speculating ideas. Many are driven to the large cities. They lack the faculty to grab and save. I do believe this country is long and broad enough that no man, if educated in the right direction, need to be driven to the city. I admit the country has to furnish some new blood to the town or the town would rot and die. The greatest good that can be done today is to teach the average boy the greatest possible profit on the least number of acres in which a family could be supported in comfort. I believe the size of the farm where that can be done depends altogether upon conditions and personality. I have often been asked why others cannot make a living on 20 acres the same as I. Again, I have often been asked how much money I make. They say tell that to the people and it will have the greatest influence to bring them out to the land. I ask that they pardon me, but I don't wish to raise a crop of 20-acre fools. I am telling what has been done and what can be done again, but it does not follow that every man can or feels like doing it. The common view that too many people have is that the farm of smaller size is rather a hard place to make a living, and should be gotten rid of as soon as anything easier comes along.

My experience has been that if a man can take up a worthless tract of land, unfit for anything in the eye of the average man, and turn it from a wilderness into a profitable home, his knowledge will increase from practical work and the world will beat a path to his door, and he will be well rewarded for the effort put forth.

Three years after I settled down on this tract of land, planting out fruit trees, small fruits and vegetables, the loads of products I marketed in 1901, the driest year we had, opened peoples' eyes and showed what could be done. Some farmers made the remark, "You make more off this blame place than we do on our large farms." Every load of potatoes brought from $40 to $52 cash. Seven hundred and twenty bushels of potatoes were harvested from 5 acres, and they sold at $1.00 and up. The yield was 142 bushels per acre. They made me $110 net profit. I was asked to make my first display at the county fair—the fast horse and the products from the 20-acre farm took all the money in sight. During the same year I was called upon to serve on the home program of our farmers' institute and tell about the possibilities of the small farm. I had everything on paper. When I was ready to give my paper I laid it on the table and did not use it because I had it written in German and I talked to the people as I would talk to my neighbors when they asked me how I raised potatoes. A few days afterwards I was called upon by Professor Burnett, Superintendent of Farmers' Institute, to spend some time that winter in farmers' institute work. It took me two hours to answer the letter in the English language. I had



Partial view of Agricultural Exhibit made by Mr. Martin.

an old newspaper to guide me in answering the letter. The next thing the newspaper men began to bother me for small articles—they always made them twice as large as I wrote them in order to fill space. After the day's work was done I spent many hours after supper reading and studying the English language. It was harder work than digging out stumps in hazelbrush. But I find that a man can learn almost anything if he makes up his mind to do it. A man ought to try to take hold of every opportunity offered him and try to make good.

In 1905 I was asked, through the County Agricultural Society of Pawnee county, to represent the county farm products on state and interstate expositions without any aid from the county. The first two attempts I made were not a financial success. The small farm I had back of me held me even. I began to study what to do. I could get no aid to carry on the work. Instead, I drove all over the country to collect my specimens so as to get a thorough representation.

I have had to change my operation of farming the last three years. A different system had to be studied and laid out. I can always find something to do on my farm in selecting the seed, planting the seed, collecting and storing seed for future use and in preparing exhibits. Every year competition is getting stronger in the markets and everywhere in exhibits. No man can stay in the race of exhibiting agricultural products unless he keeps his soil fertile and in the highest state of cultivation and takes care of his seed. The most unfavorable seasons are the most educating ones. Good, fertile soil and good care will make up for many shortcomings of seasons. There are many enemies to our crops after the seed is planted in the ground; they work under the ground and above it. Rotation and spraying are not always remedies for those enemies. Every insect has its natural enemy and also its favorite plants. Each man has got to be his own experimenter on his own farm, and as a result of his experimenting he will become more successful from year to year and his farm will become better.

I have kept a record of the income and expenses on crops grown each year—the number of bushels of each, what they sold for, how the money was invested. Farmers' Bulletin No. 325, "Small Farms in the Corn Belt," will give complete statements for each year for a period of ten years. Potatoes and small fruits were my best money-making crops. The average yield of potatoes per acre from 1897 to 1907 was 147 bushels. The average price per bushel was 66½ cents. The cost of production of 147 bushels was $32.70. In ten years I sold 7,791 bushels of potatoes.

The gross income was	$5,042.00
Cost of production (counting clearing and fertility)	2,483.12
Net profit	2,559.00
Plowing one acre for potatoes	1.50
Harrowing one acre for potatoes	.30
Eight bushels of seed	6.00
Planting, cutting and dropping	2.00
Cultivating seven times	2.40
Hoeing and pulling weeds	1.00
Digging and sorting	7.50
Marketing	6.00
Interest on land	6.00
Total	$32.70

Small fruit sold from the farm in ten years	420 crates of berries.
Average price received	$1.65 per crate.

Total amount received for small fruit	$693.00
Total amount received for pears	429.00
Premiums received on fruit	92.50
Sold show fruit at St. Louis Exposition	62.50
Gross income	$1,329.00

I started on the farm like other young men must start, with little money or property:

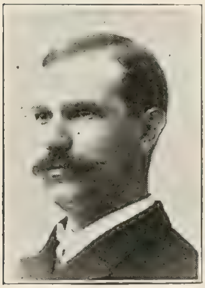
Team, one cow and chickens	$140.00
Household goods	100.00
Cash	275.00
Tools bought since on the farm	505.50
Building material, house and barn	703.50
Household goods bought since on the farm	212.50
Paid for nursery stock	540.50
Garden seed	52.50
Clover, alfalfa, grass seeds	46.80
Fences	46.90
Well, windmill and irrigation plant	180.00
Spent in traveling	794.00
For insurance	23.00
Paid in bills	162.00
Taxes	72.30
Mortgage paid off	150.00
Paid interest	64.00
Paid for horses	215.00
Total investment	$4,751.10
Potatoes and small fruits	3,888.00

I was twice offered $100 per acre for my farm and refused it. I let well enough alone. Nebraska is good enough to farm and live in. The winnings during the last three years in growing crops for expositions amount to $2,850.

As I come to close, let us commence to farm the old farm as if she were for future generations. Maintain the fertility and teach the boys how to farm smaller numbers of acres. We ought to make our farms ready for our children's children, and we ought not to sell our homes because we are offered $100 or $150. Those homes, if they are really prepared for our children, are of more value than money. Any farm can be made profitable so that the average boy can see the profit, and when they get a direct answer from the growing crops many more will stay on the farm because they can see their way out and their future before them. I know by practical work and experience that this is yet the poor man's country if he will take advantage of the resources which are so abundant. Go where you will, the small farmer has given character to agriculture everywhere and at all times. He cultivates a smaller number of acres, raises all kinds of crops, improves his home, plants trees, and loves to work, and that is what brings the results. I wish I could impress upon every young man what opportunities are before him on the farm in this rich corn belt land of the mighty Middle West, the bread basket of the nation. The spot where every national question should be solved is on the broad and small farms of the Middle West.

CO-OPERATION.

(E. N. Plank, Decatur, Arkansas, at Missouri Farmers' Week.)



E. N. Plank.

I have lived for the past fourteen years on a farm. I took a tract of upland timber containing but 25 acres of cleared land and have practically made my farm out of timber land. I have raised cattle, horses, sheep, hogs, poultry, and have grown wheat, oats, corn, rye and other crops, starting with a small acreage of apples, strawberries and peaches, and I have grown all these, so that I have been able to ship them in car lots. I mention this to show you that I have passed through the experience of every farmer who has started at the bottom floor. I have known the time when a silver dollar looked larger than a wagon wheel. I have known the time when the distance between them was months and months. I have seen the time when I did not know where I was going to get the money to buy seed and trees or to pay my help. So I have passed through all the experiences of those who started with a small beginning and have worked up.

Much of my success in later years has been brought about by co-operation. I want to say to you farmers that our calling is one of the greatest callings on earth, because we clothe and feed the world, and we, who ought to be the most independent people on the earth, are the slaves to all other classes. Imagine, if you will, two great balls rolling slowly down the planes of time, and a single file of farmers passing between those two gigantic balls, one man coming out with eyebrows seared, one with a finger broken, one with a toe off—that is today the condition of the farmers of America. Upon one side you have the trusts and upon the other you have the labor organizations, and you who produce the food and raiment for these classes are the slaves and the servants of these other two. And why is it? It is simply because you pass between these two great forces single file. Were you organized, as is every other calling, were you banded together, were you marching like an army in solid phalanx, you would not be ground, as you are, between these opposing classes. It is because you are disbanded, attempting to combat all sorts of organizations single-handed.

There is just simply one method whereby the farmer is going to be lifted out of his present condition, and that is through co-operation. You see combination on every hand. Let us suppose the combined forces of several foreign nations were to declare war against the United States, and our president should issue a call for a million men and he should say to them, "Take your arms and go out and battle against the enemy." What would be the result? You would be annihilated. In a business sense the farmer is annihilated today. Like a beggar he takes his wares to the market and asks, "What will you give?" And like a beggar he goes to buy and asks, "What will you take?" You who produce the breadstuff of the world, why don't you produce it, why don't you sell it, as does the man who sells you a keg of nails or a roll of wire, or as does any manufacturer? They consider the interest on the investment— the insurance, the taxes, the labor, the salaries, the losses, and then fix a price. When you produce a bushel of wheat, a bushel of corn, a pound of beef or pork, do you go about it in an intelligent way and say, my land is of such a value, I must have interest on my investment, my labor is worth so much a day, there are taxes, wear and tear on machinery and use of horses to be considered, and then do you put a price upon that wheat or that beef as you should, and get it? No; you allow a lot of speculators to fix a price on these commodities. You could stop them speculating as well as fixing the price if you would. But you do not hang together; you don't vote together or you would fill your legislative halls with farmers. Why don't you have a Parcels Post, Bank Guarantee Law, Postal Savings Banks and Free Trade? Because you think it is better to be independent and a slave rather than to fight for your own personal interests and vote for them. All these things you can have.

They are yours for the asking. No one is to blame but yourself, and no one is ever going to give them to you. We have had a commission appointed by the President of the United States to investigate country life, to investigate country schools, and what did they find? Inadequate schools, poor roads, poor sanitary conditions and little done to furnish recreation and other amusements.

Go to the city, visit the man that handles your commodities. He will meet you with an automobile, take you about and show you the sights. Can you meet him with an automobile when he comes to your home? Possibly some of you can, but very few. When a farmer gets an automobile the fact is written up in the paper, is considered something wonderful. Now the farmer is the one who ought to have the automobile; the banker has it for pleasure, the farmer needs it for business.

There is just one method, and one alone, by which the farmers can accomplish the ends he should accomplish and give to himself and his children the blessings of life to which they are entitled, and that is by co-operating. The farmer's first imperative need and duty is co-operation in marketing his products in order that he may get a living price for what he produces. At Voltaire, N. D., there is a farmers' organization having its own building in which to transact business and to hold the meetings. The farmers meet in an upper room and the basement is fitted up for children to spend the evening while their parents are engaged in the upper room. They have their grain elevator, insurance, and telephone companies which are managed at Crosby. I don't think there is anything more necessary than to have a nice place fitted up where the farmers can hold their meetings. You pay out more in the State of Missouri for tobacco and liquor than you would to build in every township in the State a consolidated school house with a large hall that might be used as a place where you could gather for recreation and to transact your business.

We read a great deal in the papers today about the depopulation of the rural districts. Can we blame the people for leaving the country? Go out here eight or ten miles from the railroad, and what opportunity have you there for young people to have a decent good time? We hear a great deal in the cities about young people going astray. The same thing is going on in the country only we don't hear so much about it, and what are you, as farmers, doing toward protecting your children and your neighbor's children? What are you doing towards making the farm life pleasant? Has you school house a piano, a play ground, and a croquet or tennis grounds? I want to say to you, gentlemen, that the perpetuity of this Union does not depend upon our glorious Constitution of which Gladstone said of its writing that "the finger of God was there," and of which Napoleon said it was the greatest document ever penned by man; but it does depend upon the intelligence and the sobriety of the great mass of the people. I want to say further that our greatest interest does not lie in these great and glorious institutions like you have in Columbia so much as in these rural schools where the great mass of people graduate, but where you will find neglect. Here is where you want to concentrate you interests. Here lie the hopes of America's future. Not that I do not believe in these great institutions for higher education. I do believe in them. I believe, like Emerson, that we should hitch our wagons to the stars. We should have something to make our young people ambitious, some guiding stars and some light houses. We must first improve the district schools so that life in the country will afford more advantages to the young. This can be brought about by farmers working together and voting together for a single aim.

I want to allude now to some co-operative schemes. Those with which I am most familiar were not brought out by our heads, but by our necessities. We are engaged largely in growing fruit and we have gone in to growing strawberries on a large scale. When this industry was in its infancy the farmer took his berries to town and sold them to a dealer or shipped them by express to some city. As the industry developed the nearby cities had more than they could handle and we were compelled to organize and load these berries into refrigerator cars, so that in the place of being confined to two or three local markets the whole United States was open to us. Our cars of berries today go east to Buffalo, north to Canada, west to Denver. Now, because we raise this commodity on so large a scale we buy our crates together in car lots, have our shipping shed and selling organization. When the berries are ripe the grower takes them to the manager of the association, gets his receipt for them and goes home. The manager loads the berries into cars and sells them or consigns them to points throughout the country. As this industry developed in various towns in our section, we found that two or three towns were trying to sell or to consign to the same market, and then was organized what is known as the Ozark Fruit Growers' Association. That organization sells for the various local associations in Southwest Missouri and Northwest Arkansas, so that the local association is now simply an organization for buying crates and for packing, grading and loading the fruit. Now, what has this co-operation done? It has developed that industry perhaps 50 fold until it is now the greatest in our community; it has also established a better pack—results which could not have been accomplished except through co-operation.

I handled last fall 44 cars of peaches. If I had attempted to sell those peaches myself I would have neglected the picking and worked myself to death. I gave my personal attention, together with two assistants, to packing the fruit. Three of us stood there superintending the packing all the time. I turned the selling of it over to the Ozark Fruit Growers' Association and, after paying them a commission, I am satisfied I received more for them than though I had sold them myself. Every car was sold on track at satisfactory prices.

This is just simply one way in which farmers can combine. We have in our section a Farmers' Mutual Insurance Company, whereby we get insurance at cost and pay only where there is a loss. We have our own telephone system. Four years ago I paid two dollars a month for a telephone; now I pay 25 cents a month and have better service and over more territory. These are things you can all have, and many more if you want. It may be more difficult to handle corn and wheat and cattle and hogs along the line of co-operation, but it is feasible. You must simply co-operate in a locality on raising a certain thing. If you are in a good corn producing section you know you should not sell corn. You are impoverishing your land. You should sell hogs. Organize a swine growers' association. Have a selling agent, and as fast as you get a car-load ship it out. When there is a brother hard up for money, lend him some until his hogs are ready to be marketed. In Gentry, Arkansas, the Fruit Growers' Association has a canning factory, and when the fruit will not do to ship it is turned over to the canner. They can cull apples, peaches and also can tomatoes. They also have an evaporator. They have a manager who sells all the fruit grown by the members. If you are in a section adapted to raising sheep, organize for the purpose. Improve your grade of sheep and sell your lambs and wool together. The same way with the wheat section or the growing of any other crop. You will never accomplish the results you should accomplish until you do it through organization. Can you think of a single article that you buy that does not come to you through an organization having fixed prices? Why is it you are able to stand against such a formidable array of organizations and trusts? It is because you work fourteen to sixteen hours a day. You work your children who should be in school, and your wives work. If you were limited to ten hours a day you could not stand what you are standing today. I am speaking of our average farmer. Now I presume I see before me an audience of representative farmers—farmers who have become in a measure aristocratic in their ways. You should go to your homes and act as a guiding star in your community, urging the farmers to join together and work hand in hand for the betterment of their conditions, and when you have co-operated I see before you a bright and golden future when you shall reap a just reward for your labor.

OUR DUTY TO THE STATE AND HER PUBLIC INSTITUTIONS.

(Geo. B. Ellis, managing editor, Missouri Farmer and Breeder.)

Geo. B. Ellis.

We Missourians take pride in the wonderful abundance and variety of the natural resources of our State, and are too much given to boasting about what God has done for us without thinking about what we can or should do to improve on nature. We sometimes boast that we could build a Chinese wall around our State and shut out the products of all the rest of the world, and that we could produce everything necessary for feeding and clothing several times our present population. This is true, but how much is it to our credit if we fail to develop our natural resources to the highest possibility? We owe it to Missouri as individuals and collectively in our various organized bodies to give her a name for high quality in everything we produce for the market. We claim that we have a greater number of apple trees planted in Missouri than has any other state in the Union. But what about the apples? At Christmas time, when I wanted a box of really fine apples to distribute the force in our printing office, I had to buy Washington apples because I could not find any first-class Missouri apples on the Columbia market. At my boarding house I am served most every morning for breakfast with an orange from California, although I would much prefer a nicely baked apple from some Missouri orchard. If our orchardists did their duty to themselves and to their State, not only Missouri breakfast tables would be supplied with home-grown apples, but the Missouri brand would be called for by every other state and country in the world. I would appeal to our State Board of Horticulture and to the Horticultural Department of the State University, to our Fruit Experiment Station at Mountain Grove, and to every individual horticulturist present to make such an organized effort that scale and blight, frost and codling moth and every other enemy of the fruit business in this State may be subdued and Missouri may become better known to the civilized world because of the quality and quantity of her fruit.

I have never had the opportunity to travel in Europe, but I have been told by many good men who have been there that Missouri's bluegrass grows as luxuriant as does that of Great Britain, and that our alfalfa, where it has proper attention, excels that of France, but these and other European countries are known the world over for the magnificent breeds of live stock they have produced. Our climate is just as favorable for the highest development of great races of horses, of cattle, of sheep, and of hogs as it is in any of these countries; our advantages for producing the grain to feed them is superior, far superior to any of them, but we must acknowledge that we have but one breed of animals and that is a hybrid—the Missouri mule—that carries our name into all parts of the world. Must we admit that our breeders of live stock are not equal to the task of developing as fine animals here as the farmers of Great Britian, France and Germany are producing? You, gentlemen of the Improved Live Stock Association of Missouri, can put the Missouri stamp on animals bred in this State, and which shall be good enough to win honors in any country in the world, and you owe it to the State to do it. I repeat we can do these things, and we must do them or acknowledge that we are out-classed by the farmers of other countries.

More than ten years ago the State Veterinarian sounded a warning to our cattle breeders that their business was in great danger of serious loss from the importation of cattle affected with tuberculosis. The State Board of Agriculture, the guardian of the farmers' interests, promptly put an embargo on the bringing into this State of tuberculous cattle, but immediately a strong protest went up from the very men who would have been benefited most, and the Board was compelled to rescind their order. It took the breeders eight years to find out their mistake, and the result is that tuberculosis has now such a hold on the live stock business of this State that it will take hundreds of thousands of dollars to eradicate it. It is our duty to take a broader view of these questions and look farther into the future, and when necessary sacrifice our own selfish interests for the public good. We can set the pace for the live stock breeders of other states to follow or we can trail along behind. It is by our own efforts we select our places in the procession.

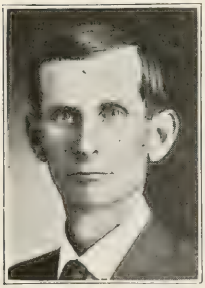
It is the duty of the members of our State Dairy Association and every dairyman in the State to emulate the example set by the Dairy Department of our State University. From New York to San Francisco the wonderful performances of a Missouri cow have been proclaimed with large headlines in our biggest dailies and some of our greatest magazines. It is not so much the fact that we have a cow claiming the world's championship that has claimed the attention of millions of readers, but it is because we have the men who have the brains to breed, feed and develop an animal machine capable of such great work. It is the duty of the State Dairymen's Association to push the organization into every county of the State and increase the butter production so that not only our own markets will be entirely supplied with our products, but the quality will be so good that "Missouri Creamery" will be in demand in every city of the country. The same well directed intelligent effort that made Missouri Chief Josephine the world's champion will make the State of Missouri the greatest dairy State in the Union.

Our greatest duty and the last one I will take time to mention, is to give Missouri a first-class system of public roads. No State can become great, no people can reach a desirable position of material or intellectual progress without a system of improved highways. The life of the country church, the development of the rural school, the prosperity of the farmer, and the betterment of country life all depend largely upon this line of public improvement. Missouri ought to spend for permanent road improvement $5,000,000 annually for the next twenty years, and it can be done if we will without any great burden on the taxpayers. Not a dollar of this money would necessarily leave the State, and in the short time of two decades we could have the best and most attractive environment for country homes of any one of the United States.

The second part of my subject is to deal with "our duty to our State institutions." It is not my purpose to speak of any of the State institutions except those organized in the interest of agriculture, but what I say of these might be said of all institutions of the State. No good citizen can fail to take a pride and give support by voice and vote to every State institution, whether reformatory, charitable or educational. I am not an advocate of high taxes but I am in favor of necessary taxes, and from what I have already said you will understand what I mean by necessary taxes. If the people of this State will take as keen and unselfish an interest in all public questions as they should, taxes can be collected and expended in such an equitable manner that we will find the system profitable rather than burdensome. Our State boards directing organized agriculture in this State have been compelled to get along as best they could with about money enough to pay office expenses. The farming industry of Missouri represents hundreds of millions of capital, but our Legislature has been so generous (?) that it has given the Board of Agriculture but little more support for its development work than has been given our State Fish Commission—a relatively unimportant line of work. Subordinate clerks in many of our State departments receive more salary than do the principal officers of the Boards of Agriculture and Horticulture. Farmers themselves are to blame for this condition, and it is their duty to demand better things and larger support. The loss to Missouri farmers in one year from two animal diseases, both of which are preventable, if it could be saved, would pay the entire expenses of the Board of Agriculture and the Agricultural College for the next ten years. It is not enough that we create these official positions, but we must give them intelligent and adequate support if we expect efficient service. What is $100,000 expense for the Board of Agriculture when we compare that amount of money with the increased production of crops that will result from the teachings of the Board through our farmers' institute meetings. The better quality of seed corn used last year by thousands of Missouri corn growers, as a result of corn shows held by the Board of Agriculture and the Agricultural College, increased the yield of corn enough to pay for the entire equipment of the State University. The Agricultural College of Missouri will be just as good and no better than the farmers want it. The State of Missouri and her institutions will never rise above our ideals and our support.

THE FARMERS' INSTITUTE WORK.

(S. M. Jordan, Farmers' Institute Director, Board of Agriculture.)


S. M. Jordan.

I want to tell you something about the institute work that has been carried on in this State. From the first of July to the middle of September we planned perhaps about two-thirds of the work that was called for. Since the middle of September the requests that have come in have not been responded to in more than one-half the cases. Since the first of July I have visited 66 institutes and there have been 60 institutes held that I have not attended, making 126 in all. At the 60 meetings I did not attend there were 13,085 people, and at the 66 institutes where I lectured the attendance amounted to 27,145 people. Now this is an estimate of the actual number who attempted to listen. At a great many of the picnics and gatherings of that nature perhaps a few hundred or several thousand were able to hear. At Chautauqua assemblies the attendance sometimes reached from 800 to 3,000 people. At the 66 institutes I visited I delivered 121 lectures to 27,145 people, making an average of 220 at each meeting. I visited 52 corn shows during the fall and judged at 50 of them. I have traveled somewhere between ten and fifteen thousand miles to do the work.

Since we have been able to respond in only about one-half of the cases where meetings were called for, we believe it ought to set the people of Missouri to thinking. Now, I don't often make political speeches, but you can call a part of my speech tonight political if you want to; but I will say to you that a part of it will be such that the politicians dare not make. I am not hunting for any office and I am certain that no office is hunting for me, so I am going to say what I believe to be true. I am going to hew as near to the line as I know how and let the chips fall where they may. I am going to say to you that I believe Missouri is practicing a false economy—a dangerously false economy.

The political speech I am going to make now is to say I don't believe Missouri people are paying enough taxes—in other words, we are not getting into our public treasury as much revenue as we ought to have there. I will say to you that if you want to go to a town that is a live town you cannot go and not help pay the price. If you want to go to a town with a low tax rate you will go to a dead one every time. You show me a county with a low tax rate and I will show you a county that if it has a court house at all it is a disgrace to the community. You show me a state with an extremely low tax rate and I will show you a state with public highways of which the people ought to be ashamed. Now I know of states that I believe are paying too much taxes. Perhaps not that, but the money is not economically administered. Missouri is getting more for every dollar she spends than any state in the Union, but we are not spending enough. I don't know what I am accomplishing for the State of Missouri, but in the work I am doing thousands upon thousands are listening to what I have to say. Thousands are requesting me to come and talk to them about the farm. But if I could be the means of adding one grain of corn to every ear in a Missouri corn crop I wonder if I would earn my pay. If I could be the means of adding one grain to every ear, and the corn was worth 50 cents a bushel, it would hire your "Missouri Corn Man" at the present rate for just forty-five years. (But I am not going to be on the job that long.) Then suppose you could have in addition to a corn man a dairyman, an orchard man, a poultry man, and a live stock man—in other words, have five men who travel constantly over the State doing work such as I am trying to do. If all could accomplish the equivalent of my adding one grain to each ear, you could hire all five of them for nine years. As it is we can scarcely employ one man.

Now the people have said that they want this work, and if you want it you must provide for taking care of it, that's all. We are practicing an economy that might be illustrated by the case of two farmers—the farmer on one side of the road is farming economically (?). He doesn't spend any money keeping up his fences; he doesn't build sheds for his machinery, if he has any; he handles scrub stock because he can buy it more cheaply; he doesn't paint his barn nor grease his plow. The farmer on the opposite side of the road is farming extravagantly (?)—he spends a little money in keeping up fences; he cuts the weeds from his fence corners, if he has any weeds there; he builds a shed for his machinery; he handles pure bred stock because it is more profitable; he paints his barn and greases his plow. Which economy should Missouri practice? I am too much afraid we are practicing the economy of the former. We are buying good machinery and leaving it out in the field to rust. So by spending a little more money than we are today, it becomes a matter of economy for the people. I wonder how many people are aware of what Missouri Institutes are costing them. Should the farm owners of the State pay the whole bill it would cost each one of them less than a two cent postage stamp. Since, however, the farm owners do not pay to exceed forty per cent of the taxes, their share has been less than eight-tenths of one cent. I am fully convinced that if the farmers were aware of how little this work is costing them they would certainly see to it that the institutes are taken care of in a more substantial manner.

Why should we spend more money to put this work among the people? I must say to you that the specialist who is solving the farm problems today has only one line of work to look after. I am giving my attention to two problems—the corn and the soil. One man in this institution is giving his life to the problems of fruit culture and another is building up the greatest dairy herd the sun shines on—each one giving his thought to a single proposition. The farmer on his lands has all of these problems to handle, all of these problems to solve, and I say to you that one life is too short to solve them all, and that farmer is wise who comes to this gathering where all these problems are talked over and discussed. Joe Wing said that the first farmers' institute ever held was where two farmers leaned across the fence and talked to one another and both learned something.

The cry of "Back to the Land" is doing two things—one beneficial, the other questionable. That cry has been attracting the attention of the business world to farm conditions, which is highly profitable, and it has caused a backward movement of people who have been off of the farm for a number of years—and the results of this are questionable. Men who have attained the age of 45 or 50 go back to the land, and in three cases out of five they prove sad disappointments. When a man has attained that age he may make a mistake when he goes back to the farm. Now there is only one way to solve this problem, ladies and gentlemen. There is one great cause that is taking our boys and girls away from the farm, and that is because we have educated them away from the farm. There is only one way to get them back to the farm, and that is to educate them back, and this great institution that belongs to you is accomplishing that work at a wonderfully rapid rate. The men that are being sent out over the country carry the University to the people, and the people come here to the University, so that thousands upon thousands of people are receiving that instruction—"Back to the Land." We find this work must be done, however, not among the older people. We will never make scientific farmers out of the grown-ups. We can help them a great deal, but if you are going to make scientific farmers you must begin with the boys and girls, and if we must begin with the boy and the girl their training must start in the country school room, must it not? If this training must go to the people we must come in contact with them before we can train them, and we cannot come in contact with them unless you supply the means.

The stories of the farm, while they are simple, almost every one of them, have remained through all these ages unseen and unrecognized. We are finding some new story of the soil from time to time. Just now comes along one from England. I don't know what there may be in it, but they are telling us of an animal that is in the soil. They are telling us our soil is filled full of these animals, and that they are eating the bacteria of the soil. They are destroying the bad bacteria of the soil as well as the good bacteria, and no soil can be fertile that is not sufficiently supplied with bacteria. If they would only eat the bacteria of typhoid fever and tuberculosis and such as that, we would feel all right and friendly to them, but when they consume the bacteria that make our crops grow we are a little less friendly. Now, they tell us that heat and sunshine are the only things that will destroy those little animals. They say that is the reason that after a drought we always have a heavy crop. The same conditions would, to a large degree, destroy the bacteria of the soil that destroy the little animals, but not to so great a degree.

Again, in irrigated districts, a large part of the year that land lies dry in the hot sunshine, and we know it is true that the irrigated lands in comparatively fertile soil seem to produce much heavier crops than the non-irrigated lands.

Now then, the stories of the soil are simple, but we have passed over them through all these ages. Ages ago a little story began telling itself under the lid of a tea kettle, but no one heard until Watt discovered the power of the steam that has revolutionized the industries of the world.

There is, however, another story that yet remains unsolved. It is with us with our first heart-beat and will be with us until the last spark of life—that something that puts the brown into the stem and the green into the leaf, that something that out of the air, the earth and the water builds up the blood that builds the bone and muscle, and the brain that rules the world, that mysterious something that men call *life*. While it is with us always and will be, the mystery is yet unsolved. There are some little stories, however, about the farm that are as fascinating as any other story. When we see a man passing along the street wearing a faded coat of blue, and we see that one sleeve contains no arm, we would like to ask him how it happened. When we go into the great penal institutions of the country where are people from all walks of life, the visit loses much of its interest because we cannot get the story of the inmates who are there. So it is that if we could recognize the fact that there is a story told by the soil to the eye that sees, a story told by the trees to the eye that sees, a story told by the plant to the trained eye, they become fascinating to the investigator. What story would be suggested to you provided you were passing along the road about the middle of October and on one side you find the trees are still loaded with green leaves, on the other side the leaves have disappeared. I wonder to how many farm people it tells the story of what that man has been growing in that orchard. To the one that knows, the story is told just as plainly as if it were on the printed page—which of these orchards would be likely to produce the most and the best fruit. It tells the story to the man that knows. We are sometimes asked whether the University will make chemical analyses of various soils. It takes a good deal of time and expense, but the trained eye, when it sees a growing crop and sees the crop harvested, knows more what the soil needs than is possible for the chemist to tell. The trained eye tells of the available fertility in the soil, while the chemist could not determine its availability, as local conditions, such as heat, moisture, etc., must be considered.

The main thing I want to say to you in closing is that we have welcomed you here in order that you could have a good time, but if that were all, our efforts would be in vain. We have welcomed you to our city because we like to have you among us, but if that were all, our efforts would be in vain. We have invited you that you may carry back a story. We have invited you to come and to get your co-operation to put this great work of training the boys and the girls to see the beauties of their farm work. There are men here tonight who perhaps twenty-five years ago bought a farm and went in debt for it. Farmers of the past have gone in debt for their farms. You are going in debt for them today and in the future will still go in debt for them, and perhaps twenty-five years after you bought the farm at $25 an acre you lifted the mortgage, and if you can recall the day when you paid that last note of the mortgage? I say to you that that was one of the greatest days of your life—the day when you looked out over your broad acres which you had paid for by hard toil from morning until night and realized they were yours. But what are you going to take for your farm today? You are going to ask, perhaps, from three to four times $25 and hand it down to that boy in a half worn-out condition, perhaps worth not three-fourts as much as it was twenty-five years. ago, and I am saying that any man who is not making his soil better by the methods he is using upon his farm is farming wrong. Now that bright boy of yours who is more than life to you is going to buy this farm and pay from $75 to $100 an acre, and how, under the shining sun, is he going to pay for that farm if he farms the way we have been farming in the past? But perhaps he is not going to farm that way. There is about as much improvement today in the methods of farming over twenty-five years ago as is in the method of digging ditches over twenty-five years ago. We are coming together to talk things over. You are leaving your homes and coming here to see the results of the problems we are working out. You are coming to hear the story and carry it back home. You are trying to learn something new, recognizing the fact, however, that there is something yet to know. In our institutes we find a great many people who do not attend, some of whom will stand on the corner of the street and make fun of what I have to say when they don't know what I have to say. They call me a book farmer, and I say that any man today who is not at least something of a book farmer doesn't know how little he knows. And do you know that if we were all like that fellow, who would not cross the street to go to an institute meeting, or would not pay 15 cents to come to this meeting, the man who objects to the new idea, we would still be plowing the ground with a crooked stick. We would be like the poor benighted Hindoo:

> ''Poor benighted Hindoo,
> He does the best he 'kindoo,'
> He sticks to his caste from first to last,
> And for trousers makes his 'skindoo.' ''

Now that boy who has bought a farm and paid from $50 to $75 an acre—it may be your boy upon whom you expect to lean in your declining years. He goes into debt for the farm. His shoulders are broad, his intellect is bright, his mind is alert. As the years go by he pays off a few of the mortgage notes, but after a while his strength is passing with the years, and finally the payments fail. Then your heart will ache when the sheriff reads the execution that must close your boy out of his home and he must become a day laborer, a renter on these fair farms of ours. Now, it is poor economy to allow a condition to obtain that is going to make more renters in our country. Missouri is rich so long as her soil is rich, but when her soil is depleted by poor methods Missouri is poor indeed. And many farmers of the State of Missouri are doing all they can to destroy this great gift that God has given us. No man has a right to destroy, to hand down this possession in a poorer condition than when it was given to him, and I say when he does that he is committing a crime against himself, a crime against the Most High, a crime against our children and the generations yet unborn. No man has a right to do that. And so we ask you to put your shoulders to the wheel at your end of the line and we will do our part here, and we will solve this greatest of all problems. The boys are going to win the game. The boys win the games after all. I say the boys have won the big battles of the world. If you go to our national cemetery and read the line on the head-stones you will find it was the boy who went to the front and bared his breast to the enemy's bullet and received it. If you will read the ages as recorded there you will find that the soldiers were boys. But I say the boys need your help, and if you will give it the boys—I say the boys—will win. Now the issue is clearly drawn. The proposition is up to you.

THE DESTINY OF THE MISSOURI HEN AND WHAT HER FUTURE MEANS TO THE STATE.

(James E. Rice, Professor of Poultry Husbandry, in New York State College of Agriculture at Cornell University, Ithaca, New York. Address delivered during Farmers' Week, University of Missouri, Columbia, Mo.)

Prof. J. E. Rice.

The three great controlling factors in successful poultry husbandry are the environment, the man and the hen.

The Missouri hen, so far as I know, is no better and no worse than any other hen.

The Missouri soil and climate are, without doubt, favorable and better than are to be found in many states, but no better than in some states.

The Missouri people, judged by their history and enterprise, will measure up favorably with those of any state.

Therefore, what the Missouri hen of the future will be will depend upon two great controlling factors—first, the environment, which includes the soil, food and climate, and the second, the people—their intelligence, enterprise and education.

In the long run, the soil, food and climatic conditions determine the development of plants, animals and man. Eventually man reacts upon the soil and it in turn reacts upon the man. But in the last analysis the soil and climate win. Favorable climatic conditions, good markets or other commercial advantages, however, may join forces with the man, in which event, by virtue of economical production and high prices, the man may be able to overcome the natural difficulties in environmental conditions.

But what has all this to do with the Missouri hen? Just this! The Missouri hen is what you men and women in Missouri make her. If she fails to measure up in size, vigor, prolificacy and in numbers and profit making power, the fault will not be the soil, the climate or markets nor the native ability of the people. These are already fixed and favorable. But it will be determined largely by your attitude toward the development of the great poultry industry in your State. In other words, the history of the Missouri hen, like the history of the Illinois hen, the California hen or the New York state hen, is yet to be made. What she is today in this State and what she will be in any state, rests with the people of the State. How well we feed her, how intelligently we breed her, how appropriately we house her and how successfully we hatch and rear her young will determine her standing among the hens of the world. In other words, the destiny of the Missouri hen or any other hen rests primarily upon the education and the enterprise of her keeper.

In other words, what we know about successful poultry husbandry and how well we apply our knowledge, the other conditions being equal, will decide whether the Missouri hen is to be superior or inferior to other hens. The responsibility is upon the people, not upon the hens.

What, then, are we going to do about it? Is the Missouri hen destined to be any better than are other hens? Education is the key note to the situation. It is the determining factor. Other things being equal, the State or nation that is best educated will win out in competition with the world. The answer, therefore, is to educate the people in the science and the art of poultry husbandry. The people cannot be left to educate themselves. The State and the Nation must take the initiative. Man cannot ''Lift himself by his boot straps.'' The government which represents all the people must boost.

There are at least eighteen reasons, all good arguments, why the State should develop its poultry industries. Briefly these will be presented.

First—Poultry husbandry is one of the largest of the agricultural industries. Its size and importance command attention and deserve consideration. The value of the poultry products on the farms, based on the census of 1900, is undoubtedly in excess of $500,000,000 a year, and in villages and cities at least $15,000,000 more. In 1900 it is estimated that more than 1,000,000,000 dozen eggs were produced. It is estimated that one egg per day and five fowls per year are consumed by each inhabitant. On this basis it would require over two and one-half billion eggs to supply our present population.

Poultry husbandry contributes an important part to the agricultural wealth of the country. Over 16 per cent of annual products, according to the census of 1900, was poultry and eggs. Of the 5,730,000 farmers in the United States in 1900, 5,000,000 of them kept poultry. Or, in other words, 80 per cent.

Second—Poultry husbandry is concerned in the production of human food of great economical importance to the entire people, and because of this fact whatever aids in improving the quality or increasing the quantity of poultry products will directly aid in the problem of feeding the race and keeping it strong and efficient.

Third—Poultry husbandry is one of the great branches of agriculture which is a basic industry upon which all others rest. When agriculture prospers, so do the manufacturing industries, the arts, the professions and trades. The farmer not only feeds the world but contributes raw materials for manufacture and commerce. Eggs, poultry and feathers are important agricultural commodities.

Fourth—Poultry husbandry is a profit making manufacturing enterprise. It is an axiomatic statement that anything that develops a more healthful and profitable business occupation in a community should be encouraged. Poultry is such an occupation. It is in a very important sense a manufacturing business. The fowls manufacture the raw material, the food, into a finished product, the egg. Therefore the establishment of a profitable poultry enterprise should be welcomed and encouraged in a community. A successful poultryman should have a seat in the City Board of Trade along with other manufacturers and good business men. The day is not far distant, indeed it is already here, when Chambers of Commerce will include in their membership the prosperous, up-to-date farmers for miles around. The success of the city man is largely dependent upon the countryman. Their interests are mutual. Each needs the other. Each should help the other. It is worthy of note that the city people are among the warmest supporters of appropriations for agricultural education. They do not look upon State aid for agriculture as paternalism. They know that in due time they will reap their own reward in more and better food to eat, larger orders for goods and more business which will come from the farmer who prospers.

Fifth—Poultry husbandry is a live stock industry and as such is superior to many other types of agriculture in conserving the natural resources of the land, the humus, and the fertility. At least one-fifth of the value of the food of the hen remains upon the farm as fertilizer. There are presumably not less than 30,000,000 hens in Missouri. If so, they consume annually approximately $30,000,000 worth of food, the manurial value of which would be about $6,000,000. This, if properly handled and applied, would be an important agricultural resource saved to the State, which, if sold from the State in the raw material, the grain and green food, would have depleted the soil to that extent. Poultry husbandry, when properly conducted, may be made a soil-building and not a soil depleting agricultural industry. It is on a par with every live stock industry and should be encouraged. "Keep fertility within the State" is a motto that could well be framed and hung in every agricultural college and legislative chamber.

Sixth—The State should encourage the production of those products for which its soil, climate and markets are best adapted. Missouri is especially well suited to the raising of poultry, hence this industry should be encouraged. One of the great developments in the evolution of modern agriculture is the gradual adaptation of agricultural industries best suited to the conditions—the soil, climate and markets. In the beginning we first had grazing, then grain growing, then intensive live stock feeding for meat, then animal productions—milk, eggs, etc., the concentrated, finished, high priced products, and also fruit, vegetables, flowers and manufactured farm products—butter and cheese, etc. In the last epoch the tendency at first was for everyone to try to grow everything. Then came the other extreme, namely, specialized farming, where only one crop was grown. Gradually the pendulum is swinging backward and farmers and economists are learning that a rational type of agriculture must comprehend a well organized system of mixed farming in which live stock plays an important part. Poultry husbandry adapts itself well to other types of farming, and on this account should be seriously considered and heartily supported by the State.

Seventh—It is a sound principle in agricultural economics that a state should produce within its own borders all the products to supply its own people, provided they can be produced more profitably at home than they can be grown and delivered from abroad. Hence, Missouri should rejoice not only in her natural agricultural resources, but also in the large, accessible and rapidly growing markets within her borders. Home consumption and home production keep money circulating within the borders of the State.

Eighth—A state should encourage the production of products best adapted to export trade. Missouri has not yet passed the state where consumption has caught up with production. Missouri not only does not import, but is a large exporter of poultry products. It therefore becomes an economic question of great importance to export these products that will pay the largest profit, ship easiest and impoverish the soil least. Poultry and poultry products, because they are concentrated, high-priced and require skill in production, are among the best if not the best to produce for export from the State.

It is a matter of grave concern to the State, as it is to the individual or nation, whether it is sending into other states or countries dollars to buy the product of the skill and labor of others or whether it is receiving from other states or countries the results of their skill and labor and giving in return money which might appropriately have been earned and kept by persons within the State or country. In other words, it makes a large difference whether we are taking a dollar out of our pocket to make a purchase or whether we are putting a dollar into our pocket as a result of a sale.

Ninth—Poultry products possess intrinsic merit as human food. They are not merely considered as luxuries, but are necessaries in feeding the human race. Eggs and poultry, the same as beef, wheat and corn, are staple food products. The business that has to do with the production of human necessities possesses stability. Moreover, eggs and poultry possess added qualities of digestibility and attractiveness which place them in a special class with milk among the few articles which especially tickle the palate of man, and which invalids can only use. Because of this great commercial value of poultry and eggs as as a human food, a state is especially justified in fostering the development of the poultry industry.

Tenth—State aid to develop the poultry industry is not paternalism. By helping the poultrymen to grow more and better poultry every other industry, profession and trade is helped. They are all to a large extent dependent upon the farmer.

Eleventh—It is the duty of the State to try to prevent financial loss and to help make every legitimate business prosper. By educating the poultrymen how to keep poultry more profitably and thus prevent loss, the State is practicing the sound policy of considering education as a form of insurance and thus is doing what every great business concern would do to guard against loss and waste. The underwriters inspect elevators and safety fire appliances and the efficiency of fire departments. States supervise banks to insure efficiency and guard against loss. Why, then, should not the State safeguard its agricultural interests against waste and unprofitableness in management? The best investment for an individual or a corporation or a state to make is in education which will insure efficiency. Money spent for education should be looked upon by an individual or by a state or a nation as paying the premium on an insurance policy with annual benefits and dividends to be derived immediately and to continue through life.

Twelfth—It requires special training and education to meet competition between men, states and nations. That man or nation will win out in the long run, other things being equal, who is best educated. If Illinois educates her poultrymen so that they produce a better quality of poultry, breed more intelligently, feed more successfully, build poultry houses more economically and rear more skillfully and market more extensively, the Illinois poultrymen will be selling pure-bred eggs and stock to the people of Missouri for breeding and egg production and possibly also for consumption, unless Missouri gives her poultrymen an equal opportunity for education.

In this competition for the markets of the world, like all competitions in the great battle of life, the fittest survive. Fittest is frequently determined by education. The trend of the battle in each state will be determined eventually by the educational policy of the State. The victory will gradually but surely go to the State, other things being equal, that most wisely and most liberally educates her farmers.

Thirteenth—Money expended by the State to educate farmers to a better knowledge of the best methods of handling poultry is a good business investment. It will pay splendid interest on the investment. A state could well afford to borrow money to educate her people. For example, if by better methods of feeding, breeding, housing and the rearing of poultry the 30,000,000 hens in this State should be induced to lay one more egg each per year, and these eggs should sell for two cents apiece, this would increase the gross income $60,000 per year. If, then, to this the poultrymen, by better methods, should be able to decrease the cost of producing poultry one-fourth cent per pound, this would mean a saving of one cent per four-pound fowl, or $300,000 per year. If, by better methods of breeding for constitutional vigor, better sanitation, more desirable poultry houses and better methods of rearing, the mortality in our mature flocks would be decreased two per cent, this would make a net saving of at least $300,000. All this is not only possible but probable, if the proper methods which are known at the present time, but which are not generally understood, should be practiced by a large proportion of the farmers and poultrymen throughout the country. It is within the province and power of every state to bring all this about. Is it worth while?

Fourteenth—Poultry husbandry should be given attention, because less has been done for it in proportion to its value than for any other agricultural industry. It is now a question of restitution for previous neglect on the part of the State. Ever since the agricultural colleges and experiment stations were founded the dairy, horticultural, crop growing and general live stock interests have been given serious and extended attention, and as a result they have been vastly benefited. The poultry interests, because comparatively small in the value of individual holdings, though as large or larger in the aggregate value than many other branches of agriculture, have been overlooked and ignored, and as a result poultrymen have been seriously handicapped. The poultrymen, until very recently, have been obliged to hobble blunderingly along in the darkness of ignorance, while the dairyman, horticulturist, gardner, stock raiser and all have been working in the light of knowledge shed by experiment stations and agricultural colleges in every state in the Union.

The wonder is that poultry husbandry has survived the shock. Thousands of poultry failures throughout the length and breadth of the land are the grim, silent monuments that mark the progress of the industry during these many years in the bondage of ignorance. In the light of our present knowledge, recently acquired through poultry experiments conducted at the experiment stations, a large proportion of the failures could have been avoided. Proof of this will be given in the lantern slides which will follow. It is not our plea that less money should be given to other agricultural interests, but that more support should be and must be given to poultry husbandry.

Fifteenth—The State, by liberal appropriations, can employ experts to conduct experiments to discover the truth, and then teach this knowledge to the people more economically than can each one learn the right way for himself in the expensive school of experience.

Liberal appropriations for agricultural education are justifiable if for no other reason than on the ground of being good economics. It was infinitely cheapter, for example, for the state of Maine to pay a few thousand dollars to carry on experiments which resulted in emphasizing in an authoritative way the fact that hens could be kept more profitably in large flocks and could be fed more successfully by the hopper system of dry feeding; or for the New York Experiment Station to show that mineral matter was an indispensable factor in poultry feeding; or for Cornell Experiment Station to prove that chickens could be reared more successfully and with vastly less expense in large flocks of 250 to 300 in colony houses than in small flocks of 25 to 50; or for Connecticut to discover the bacterism pylorum as a cause of one of the most dreaded poultry diseases known as white diarrhea in chickens; or for Rhode Island and the United States Department of Agriculture to discover the cause of the extensive scourge known as "black head" in turkeys; for West Virginia Experiment Station to prove the superiority of pure bred over mongrel poultry, or for the Canadian Experiment Stations to radically increase the market quality of poultry through improved methods of breeding and fattening; for many other states and provinces to discover and give to the world important truths which have revolutionized methods of modern poultry husbandry, yes, vastly cheaper than it would have been for thousands upon thousands of persons all over the world to have attempted to learn these things for themselves, most of which would have been impossible on the farm because of the lack of scientific training and facilities. Poultrymen cannot afford to experiment. The government should do that for them. It is the government's business, not the poultrymen's. It is the government's duty and privilege—a privilege to do for all what each cannot do for himself. This is a function of government which should not be ignored nor slighted. The government has been slow to recognize this fact as regards poultry husbandry. It is not yet too late to make amends. It should be done immediately.

Will the government act? Will the poultry industry be safeguarded? That all depends upon the attitude of the poultrymen. If the government is "of the people, for the people and by the people," it naturally follows that the people should ask for what they want, and the government should grant the request. You poultrymen in Missouri have only yourselves to blame if poultry husbandry has not been given sufficient attention on the part of the Agricultural College and Experiment Station. The same may be said of poultrymen in New Jersey, Kansas, New York and every other state. Until recently we have not appealed to the legislatures or to the agricultural colleges and experiment stations for help either individually or collectively. We have been busily engaged gathering a few eggs while other agricultural interests have been, so so speak, "sawing wood." It is high time we cut a little sawdust ourselves. We should not and have not asked for more than the importance and the necessities of the poultry industry demand, but we want that much. We will not get it unless we go after it.

Sixteenth—The money appropriated by the State and national governments for agricultural education and experimentation should be expended equably and with due regard to the commercial importance of the great agricultural industries and to the number of persons concerned, and the immediate needs of the various divisions of agriculture, such as dairying, horticulture, crop growing, poultry husbandry, etc. The persons in authority in many colleges and experiment stations have seemed to entertain the thought that poultry husbandry was something outside of the realm of agriculture, and that hence nothing could be done in the matter of giving instruction or carrying on experiments in poultry husbandry without special appropriations from the State. Their arguments usually have been that they did not have money enough to meet the requirements of the departments already in existence. This is equivalent to saying that poultry husbandry is not worthy of recognition, or not having been recognized that it will not be necessary to give poultry husbandry support until the other departments "get their growth." Meanwhile increased appropriations are given each year to the departments already established and poultrymen are told that they should go to the legislature to get the money to establish a department. However commendable and desirable it may be for the legislature to make special appropriations for poultry husbandry, this is not necessarily the best plan by which to make a beginning. Reform should begin at home. The agricultural colleges and experiment stations should show their good intentions and their appreciation of the needs of poultry husbandry by making a start before getting special appropriations, even though the beginning be small. There is no question of doubt about the result, the effect would abundantly justify the experiment. It is the square thing to do.

Seventeenth—The State should help in building up the poultry interests by assisting poultry organizations. Education in poultry husbandry, it should be clearly understood, does not refer alone to instruction in agricultural colleges and experiment stations. The quality of instruction that is being given in poultry husbandry in the agricultural colleges and the investigational work that is being done, the results of which are being published in bulletin form, is valuable and far reaching in its influence—far beyond our ability to estimate its worth in dollars and cents; but these, however, are only two among many effective methods of education.

Poultry associations, through co-operation and united efforts, are powerful educational agencies in the development of a more profitable poultry husbandry. We must more and more look to these organizations to advance the cause of education. The poultry show is a valuable agency in popularizing the keeping of pure bred poultry and thus educating the people to know good poultry when they see it. The poultry institute and the educational exhibits attract and instruct persons who could not otherwise be reached.

Co-operative buying and selling, united action in expressing the will of the people before legislatures, board of trustees and directors of agricultural colleges and experiment stations are all to be commended and encouraged and should be supported. To do this every wide-awake poultryman who has a spark of pride in his occupation should be an active member (not a "dead one") in a local, state and national poultry organization. We have in our American Poultry Association an effective instrument for progress. Whether or not it shall fulfill its mission will depend upon the attitude of the poultrymen of this country, who have at heart the upbuilding of our great poultry interests.

Your are indeed fortunate in having an able and energetic representative in your State to look after your poultry interests. I refer to Mr. T. E. Quisenberry, who has the honor of representing your State in the executive committee of the American Poultry Association.

The various correspondence and reading courses now being offered, although unable to provide the important practice work, are undoubtedly valuable agencies for imparting information to a large number of persons who would not feel that they could leave home or assume the expense of taking a full course or short course in college.

The poultry and agricultural press is exerting a potent influence in improving the poultry practice of the country. Each year, more and more, as the readers demand it, the press is giving attention to matters of fundamental importance to those who are hungry and thirsty for information. The agricultural colleges owe a great debt of gratitude to the press for the splendid service it has rendered in supporting the work of the poultry departments. They have been pioneers in the campaign of education. They have done much to shape public sentiment by printing the facts regarding the shortcomings as well as commending the successes of the poultry departments.

Eighteenth—The State should develop its agricultural interests and the agricultural colleges, and the experiment stations should give attention to the various branches of agriculture, with some regard to the comparative number of persons concerned. More persons are interested in poultry husbandry than in any other one branch of agriculture. It is largely because of this fact that Director L. H. Bailey of the New York State College of Agriculture, one of the best, if not the best friend the poultrymen have ever had, says that he would favor the establishment of poultry departments and provide for their active support if for no other reason than their great pedagogic value based on the fact that so many persons can be reached, as he expressed it, "in terms of their daily lives." The accuracy and force of this statement is abundantly proven at Cornell by the rapidity with which large editions of poultry bulletins are exhausted, for example, 30,000 copies are mailed within a few months, and by the rapid increase in the poultry correspondence, from a few hundred letters to over eight thousand letters per year, and by the large demand for instruction in poultry husbandry, which has increased in seven years from 27 to 174 students selecting Poultry Husbandry courses, and many students turned away because of lack of accommodations. Similar statements may be made with regard to the poultry department in many other states. This, then, is an abundant justification for the establishment and support of poultry departments.

In view of these facts is not poultry husbandry entitled to fair consideration as a business and as a profession that will rank with other leading occupations, and as such is it not fair to ask for equable consideration as a subject to be taught and investigated in the agricultural colleges and experiment stations? We are willing to let our case rest with that great important jury, that court of last resort, that jury that has settled so many questions and settled them right—the American people.

Missouri Farm Management Association.

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MISSOURI FARM MANAGEMENT.

(D. H. Doane, in charge of Farm Management in Missouri.)

D. H. Doane.

During the early summer of 1906 the U. S. Department of Agriculture, through the Office of Farm Management, started farm management investigation work in the State of Missouri, and from that date until the beginning of 1910 it was continuously carried on. The purpose of the work was to study the results that the farmers had gathered from practical experiences, to determine, if possible, what the most successful methods and operations were that the farmers themselves had worked out; in short, to get right down to the practical facts as they existed on the farms in Missouri under all the varied conditions as they are found here. After spending about four years at this, the demonstration work was started. This consisted of putting into practice the results of the investigations. Farmers who requested our assistance were visited and complete plans were suggested to them for the carrying on of every detail of the farm operations.

One year has passed since this latter phase of our work was started, and today we have some rather gratifying reports to make. From one farm, where a number of hundred head of hogs are fed annually, the report comes that by following one of our suggestions a car load of corn was saved on the summer feeding. From another farm in Franklin county a farmer says, "When you found me I was ready to give up. I could not see my way out. But the last year has made a hole in the stone wall, and I now know that I am on my feet and success is sure to come."

On a little farm in the Ozarks that produced, the year we started the work, less than 10 bushels of corn, less than one-fourth of a ton of hay and about 15 bushels of potatoes per acre, yielded the next year over 40 bushels of corn, nearly 100 bushels of potatoes and about two tons of hay per acre. The farmer in question was a worker and followed our directions very carefully. He was not rich, in fact the year previous to the one just mentioned it was necessary to lose a hay crop on account of not being able to buy a mower or to borrow one at the particular time it was needed.

You may ask how we got these rather remarkable results—for example, the corn crop. First, we put our corn on a field that had had cowpeas on it the year before, the first ever grown on the farm. We lap-disked the corn ground before we plowed. We prepared a seed bed that would have done for a garden. We paid $3.00 a bushel for the best seed we could buy, tested it carefully, and knew that 98 per cent of it would grow. Cultivation did not stop when we had to leave the field with the team, but continued with one horse. Cowpeas were planted in the corn with a hand planter, when the corn was about four to six inches high; in fact, everything that we knew of, that would contribute to a successful yield of corn, was done for this crop. We applied some fertilizer, but in a way that we could get a check on the results from its use. Results on this little farm show conclusively that successful farming does not consist of the doing of one thing well—for instance, the purchase of pure bred seed—but the doing of every farm operation in the best possible way known. Successful farming is everyday farming. The successful farmer is the one who spares no pains to get the best and do the best. He does not have "his wish-bone where his backbone ought to be." Business farming means head as well as back farming. We can tell to a penny what it cost us to produce every crop on this farm, and we know which ones paid us best, and from these figures we have a positive basis for our future operations. I am often asked how we obtained such results in one year, but if I answered, telling the real secret, it would be a story so long that few would read or care to listen, for the success of the crops in 1910 began with the work in the fall of 1909 and continued until the spring of 1911. It was the work done every day, it was the planning done every night, it was the result of the reading put into practice, it was business farming.

We are sometimes asked, "How do you start the work on the farms of those who desire to receive your assistance?" I can answer this question best by telling of our Missouri Farm Management Association. This organization was formed during Farmers' Week, 1910, at Columbia, Mo.

There were seventy-five charter members, and the resolutions adopted at that time express so well the object of the organization that they are given in full.

MISSOURI FARM MANAGEMENT ASSOCIATION.

Motto—Do.

Object—Organization, co-operation, diversification, intensification.

RESOLUTIONS.

First—Be it resolved that we, the undersigned farmers and other men and women of the State of Missouri who are interested in the betterment of Missouri Agriculture, do organize and band ourselves together for the purpose of extending the work in Farm Management in Missouri. It seems to us, under the present plan of operations, that there are not as many farmers coming in direct contact with this work as there should be, and it is our purpose to help extend directly the efforts of the working force of this Association.

Second—We further believe that the successful principles and practices of agriculture that have been found to be practical and profitable, both by the use of experiments and the results obtained from farmers, should be demonstrated under a well-balanced and business-like farm plan, under farm conditions; for we believe that farming is a business that cannot reach its highest development unless business methods are used in its execution.

Third—We further believe that the Office of Farm Management of the U. S. Department of Agriculture should, in the execution of its work, co-operate with the Agricultural Department of the University of Missouri, the Experiment Station and the Missouri State Board of Agriculture. Farm Management embodies the fundamental principles of agriculture for which the aforementioned institutions stand; each is to a greater or less degree dependent on the other for its greatest development and success, and all should, therefore, work together in a helpful and harmonious relation.

Fourth—We believe that the prime work of Farm Management is to demonstrate and not experiment. That our measure of success is determined by the rapidity and permanency with which our farms are built up in fertility, and the net returns we receive after each year's operations.

During the summer and fall of 1910 members of the Farm Management staff, both from the Government, and those employed by the College, visited between 40 and 50 members of the Association, and helped them in a definite and concrete way in putting their farms on a business basis. In other words, the object of these visits was to help the farmers organize their farms. Soil treatment was suggested, a definite rotation of crops was outlined and complete details for the handling of all crops were mapped out, and the suggestions made were sent to the farmer in typewritten form.

It can be seen from this that the work had a decidedly practical value. It resulted in a direct financial benefit to the farmer as well as assisting him in building up the fertility of his soil. It is little wonder, therefore, that it has grown to such proportions.

At the beginning of this year, 1911, it was found necessary to charge a membership fee to the Association, and $1.00 assessment was levied. Today over 150 members have paid up their fees for 1911, and others are joining every day.

RELATION OF THE ASSOCIATION TO THE FARM MANAGEMENT DEPARTMENT.

An everyday question that arises at this time is the relation between the Farm Management Department and the Association; it is simply this: They who are employed by the Government and by the State to carry on Farm Management work in Missouri are desirous of knowing those who are directly interested in the work. They have every desire to get in touch with men who want definite help in carrying on the work of their farms. In order to find these farmers, it was deemed desirable to form this Association, to be composed of those who really cared for help from the Department. So it came about that the Missouri Farm Management Association was formed, and in this way it can be determined who the farmers are who are really in sympathy with our undertaking. It gives a definite concrete body of up-to-date farmers with which to carry on the work. By working with members of this Association, it is not necessary to spend any time with men who are just partially interested in what is being done. When a man pays a dollar to become a member, and signs a statement to the effect that he is desirous of obtaining a definite plan for carrying on his work, it is reasonably certain that he is the right kind. In short, the Association was formed for the purpose of combining and organizing those farmers in Missouri who want help in farm management problems. This organization will ultimately carry on a great deal of co-operative work in the buying and selling of seeds, pure bred live stock, and supplies for the farmer. As soon as the organization becomes strong enough, and its members have the products for sale, there is no reason why there cannot be a system of buying, selling and exchanging among the members that will be one of the greatest factors entering into the economical operation of the farm.

One may ask if by becoming a member it assures him a visit from some member of the Farm Management staff. The answer is, that it does not. It is the aim and purpose to visit, first, all the members of the Association who desire to have some one come to their farms to help them with their work, and after that others who desire help will be visited. The expenses in visiting a farmer and helping in planning the work are a great deal more than one dollar, so no one can possibly feel that the dollar entitles him to a visit. It is simply an indication that you are interested in the work and wish to get in touch with it.

Some think it is necessary for us to turn upside down every practice and method that we find being followed when we reach the farm. This is very far from the truth. It is seldom that we make any sweeping changes—in fact we find that in 90 per cent of the cases we can accomplish more by adjustment than by revolution. Here is a farmer growing crops that are giving very satisfactory yields, but he says to me "I am not making money." Upon investigation we find that there is little we can do to improve his crop yields, but we find that his *stock* is being handled at a loss. He is putting good crops through poor stock. He is running efficient fuel through poor machinery. Our work in such a case simply consists in adjusting the running of the farm—namely, putting the successful crops through profitable stock, doing away with the worn-out and hard-running machinery and putting in a kind or quality that can be kept at a profit. Sell two of the boarder cows and buy one that will return a good income. Sell the old gelding and buy a mare that will raise a colt worth one-third to one-half of her purchase price at weaning time. This has been done. We are doing it now and intend to keep on doing it. These practices and ideas are not theoretical—they are being proven every day that our work is being followed.

We could not help but feel good during Farmers' Week when one of our members said, "We received your letter notifying us that our annual fee to the Missouri Farm Management Association was due, and, after talking it over, my wife and I agreed that dollars were not very plentiful, but rather than give up the work we would pay a fee of one hundred dollars." These are the things that count. When you make farming more pleasant and at the same time more profitable, then it is that you have solved the real problem for the farmer.

MISSOURI FARM MANAGEMENT DEMONSTRATION MEETING.

(D. H. Doane, in charge of Farm Management in Missouri.)

R. S. Harriman.

I have been asked to write about the Demonstration meeting we held last year, 1910, on our No. 4 farm.

In looking over the notes concerning our results and the reports about the meeting, I find that W. L. Nelson, Assistant Secretary of the State Board of Agriculture, who was one of the speakers at the meeting and a very interested and attentive listener during the whole day, has given the best report on the meeting that was written. Consequently, I am taking the liberty of using his ideas, with a few exceptions, and the adding of some results obtained since the meeting, as he expressed them for an article in the Breeders' Gazette of October 5, 1910.

"The dream of a farmers' institute in the fields has finally been fulfilled. For several years we have had 'the college on wheels;' now we have the farmers' institute on legs. While the methods are close akin, the latter has a decided advantage, representing not only a movement toward the farm but actually on the farm and in the fields.

"It was in Cooper county, Missouri, that the demonstration farm meeting took place on Thursday, September 15. It had been advertised as a demonstration farm meeting, inasmuch as the place was Missouri United States Demonstration Farm No. 4, owned and operated by R. S. Harriman, but it was frequently referred to as a 'Show Me' farmers' picnic and institute. Putting it thus in popular parlance seemed most appropriate, as the 'Show Me' State furnished both the location and the leaders for the first-of-the-kind institute on legs.

"Some seven or eight years ago a young man from Lawrence county, Missouri, proposed to those in authority in the Department of Agriculture to organize an office having for its object the study and administration of agriculture from the standpoint of the farmer. By this was meant so to train men that they might see the farm as a unit, rather than any one part of it. The horticulturist sees the apple tree, the dairyman the milch cow, and the agronomist the corn crop or soil, but all these the general farmer must see. The one who had this vision further said that, as the farmer has thousands of details to correlate and shape into farm plans, there was need of a man trained in this kind of work. From this came the Office of Farm Management, and at its head was placed the one who had conceived the work and given it form, namely, W. J. Spillman, reared on Missouri soil and graduated from the University of Missouri. It was soon seen that Prof. Spillman had touched the keynote and the work grew rapidly. This development brought about the present organization of the office.

"The United States is divided into three sections, and one man, working under Prof. Spillman, is placed in charge of each and is held directly responsible for the work of his section. C. Beaman Smith has charge of the northeast section, of which Missouri is a part. Each of the three national sections is subdivided, a state constituting a subdivision. The work in a state is in control of one man from the Department of Agriculture, who, if possible so to arrange, works in co-operation with the college of agriculture or experiment station of the State. Prof. D. H. Doane has charge of the farm management work in Missouri and is assisted by Don. G. Magruder and O. R. Johnson. There are now four demonstration farms in Missouri. The owners of these farms are R. S. Harriman, Bunceton; J. C. Smith, Conway, in the southern section of the State; C. D. Simonson, Memphis, in the northern part, and C. M. Long, Columbia, in the central section. Missouri, with the first Farm Management Association, seems to be leading all other states in this movement. No small part of this success is due to the very generous co-operation between F. B. Mumford, Dean of the Missouri

The dinner table spread for the noon meal by the farmers' wives, who helped in a most essential way with the success of the meeting.

Agricultural College, and Prof. W. J. Spillman of the Department of Agriculture.

"Early last spring the plan of farming to be used on Demonstration Farm No. 4 was carefully laid out by Mr. Doane, and the details of all farm operations were considered. The farm was mapped, a soil treatment outlined, and a crop rotation established. Then the utilization of crops by stock was taken up, and assistance was even given in the buying and selling of all crops and stock, every operation being carefully accounted for in a complete system of bookkeeping. It should be stated that Mr. Harriman received no financial aid from 'Uncle Sam' or the State of Missouri, so that his place is in no sense intended as a model farm. The improvements are not extensive. Even the old rail fence, once so common in Missouri, is still in use, but about the farm, which includes both bottom and upland, there is an air of neatness, thrift and industry. One is impressed with the fact that here is a home.

Three hundred farmers and their wives spent the forenoon in Nature's Auditorium, listening to Farm Management talks and the plans that had been made for the Demonstration Farm.

"As success seemed to attend Mr. Harriman's work, it was decided to hold an all-day meeting—a picnic whose promoters had a purpose—right on the farm. The day came, so did the people—some 300 of them, men and women representing every section of the county in which the meeting was held, a dozen or more other counties and five or six other states. It was a great gathering. As one looked into the faces of the thoughtful, intelligent men and women there he was impressed with the fact that here were people eager to better understand and more fully appreciate the problems, possibilities and pleasures of life on the farm.

"First, attention was called to the needs and objects of such a meeting. It was pointed out that farming is a business demanding brains as well as brawn; that farming today is a far more intricate proposition than in the time of our forefathers, when men could skim the cream off of one quarter-section, then move to another 160 acres; that changed location, not crop rotation, gave to the pioneer a land productive of plenty; that farming demands fitness, and that while almost any man may 'mine land,' no fool can farm it. One speaker declared that it is folly for the farmer to think about cultivating more land, when it is impossible for him to get sufficient help as it is. 'What, then,' came the question, 'must be the solution of this perplexing problem? What, if not to increase the yield, thereby decreasing the cost? It will not come through added acres, but by added bushels,' continued the speaker. 'The demand is not so much for larger farming as for better farming.'

The afternoon was spent in examining the crops as, and where, they grew. Here the soy beans stood shoulder high, set from 100 to 200 pods, and had nodules on the roots as large as small peas. The soy bean has a feeding value equal to oil meal—home-grown protein.

"One important object of the farm management movement was said to be to help the farmer know the cost and to reduce the cost. This thought ran through practically every talk. Among the speakers were: F. B. Mumford, Dean of the Missouri Agricultural College; T. C. Wilson, Secretary of the Missouri State Board of Agriculture; W. L. Nelson, Assistant Secretary of the same Board; J. A. Drake of the United States

Department of Agriculture; Prof. D. H. Doane, R. S. Harriman and Miss Ilena Bailey, the latter of the State Board of Agriculture.

Prof. Spillman, who had been expected, was ill at the time and unable to be present.

"At the noon hour a dinner, not only fit for kings but fit for farmers, was enjoyed, after which Mr. Doane explained the work of the farm, using large diagrams showing the different fields. One diagram showed the farm as it was when the work was started. The other showed how the farm had been re-planned, every bit of the ground utilized in some way and the fields so divided as to fit the rotations. The rotation scheme is for four fields of from twelve to fifteen acres each. Three fields are used for a primary rotation and one field is subdivided into three equal parts, or three small fields used instead.

The cowpea field caused no little comment, for here between three and four tons of hay was harvested per acre. It was cured and stacked in a curing rack, which makes it possible to stack the vines when green and thus save all the leaves.

"The primary rotation on twelve-acre fields was as follows: First year, corn; cowpeas planted in one-half the corn and rape sown in the other half. Second year, oats, to be cut for hay or threshed, and clover sown in oats in spring. Third year, clover.

"Secondary rotation, fields four acres each: First year, corn; cow peas hogged down. Second year, soy beans, rye pastured. Third year, rape pastured. It was explained that the rotation was not in 'full swing,' as the work had not been carried on long enough to get each field to producing just the crop desired.

"At the conclusion of Mr. Doane's talk, the trip over the farm was commenced. It was an inspiring sight to see 150 farmers moving out into the fields. The first field visited was one that had been spring-sown to clover in April, 10 pounds per acre, without a nurse crop. The year before the field had been in corn and cowpeas, and the preparation for the clover had all been made with a harrow. The excellence of the particular harrow used and the effect of the cowpeas on the soil made it possible to get almost a perfect seed bed. This field of clover was unusually fine.

"The next field had produced a 50-bushel oat crop. The Texas Red Rust Proof seed used had been treated in a 40 per cent formalin solution of one pint formalin and 45 gallons of water. As a result, there was not a head of smut or rust that could be found in the field, and the oats, fit for high-class seed, will command a price about double that received for oats at threshing time. After the oats were off cowpeas were drilled with a corn planter in the stubble, about 25 pounds per acre. These peas are to be turned under this fall. This field goes to corn next year.

Each crop and the treatment given each field was fully explained as they were passed over. An inviting place to rest called for a stop and a talk. "Yes, on the lower part of this field we grew Alsike Clover forty to fifty inches high, in places where it was so wet that previous to this year only slough grass would grow."

"Next came the field of soy beans. Here was the most remarkable crop of all. The soy beans, 25 pounds per acre, had been drilled with a corn planter June 22. The last of May or early part of June would have been better. At this time they were from about waist high to shoulder high and very heavily loaded with pods. Counting pods that were just setting, it was found that a single average plant had from 100 to 230 pods on it, with from one to three beans in a pod. There were growing in this field several varieties, but the one that was doing the best, and the one that was being grown as a field crop, was the Medium Yellow. The Hope and Austin varieties, however, gave promise of being very productive and were more early-maturing than the Medium Yellow.

"In one field was a wonderful growth of cowpeas and corn, a growth so dense that to walk through the field was out of the question. A small tract of low, wet ground had been made to yield good returns by seeding to alsike clover. The last field visited was one of three and one-half acres of rape, supporting forty head of 80-pound hogs that were getting two pounds of corn each per day.

Cowpeas in corn. This catch crop made for Mr. Harriman about $100.00 that he had never previously made, by pasturing down the peas with western lambs.

"Truly, it was a great agricultural 'field day.' As each field was reached, and while the actual crop or result was in plain view, stops were made and little institutes were held, detailed descriptions being given as to just how the field had been prepared, the kind and amount of seed sown, the date, method, how the crop had been treated or cared for, and in some instances the cost of the work and yields were given."

After the reports for the year's work came in, in the fall, some results about like this have shown up:

The fifty-bushel yield of oats sold for 60 cents to 80 cents per bushel for seed, and they were replaced for feed at 35 cents per bushel. The soy beans were used for winter hog feed in a very satisfactory way, as it eliminated the necessity of the purchase of any high priced protein feed. The hogs that were pastured on the rape made a pound of gain with a pound of corn, thereby saving, under ordinary conditions, four pounds of corn on every pound of gain.

The corn and cowpeas fields had western lambs turned into them, with results about like this:

September 26, purchased 140 lambs weighing 53 lbs. at $6.00 per cwt.	$445.00
Freight, commission, etc.	36.00
Total cost on farm	$481.00
Freight, commission, etc., in marketing	39.00
Total cost	$520.00
Fifty-seven days after purchasing they were sold at an average weight of 71 lbs. at $6.40	630.00

One lamb died on the farm and there was a cut on a few at St. Louis. This shows that we had on a 53-day feeding operation $110.00 to pay for 70 bushels of corn (the estimated amount the lambs ate while in the fields), the cowpeas gathered from 10-15 acres of corn, interest on investment, labor, etc.

To the practical farmer there need be no special emphasis laid on the importance or value of the pasturing down of the crops by hogs and lambs, as they were in these instances. This year the fields so treated will tell a tale of maintained and in some cases increased fertility, which will be shown in a financial way by the abundant harvests of 1912.

At the "round-up," following the completion of the trip over the farm, there was a kind of informal but enthusiastic "experience meeting," in which many told of how they had been impressed by the day's work as developed in the first Demonstration Farm Meeting ever held, and how they felt about it. Then it was seen that good seed had fallen in fertile ground. The common thought was, why had not the plan of holding a farmers' institute, where the lectures might be illustrated, not with dull and often uninteresting maps and charts, but with living, growing things, been tried before. It seemed the natural, sensible, easy way. It was the Missouri way—the "show-me" way. It works!

SIZE OF FARMS FOR GENERAL FARMING.

(G. F. Warren, Professor of Farm Management and Farm Crops, Cornell University. Address Delivered at Columbia During Missouri Farmers' Week.)

G. F. Warren.

One of the most striking results of the agricultural survey work which we have been doing in New York is the positive way in which the size of business has affected profits. In this work we have found the year's profits on about 1,500 farms in two counties that are quite different in type, yet the conclusions on nearly all points agree.

The size of business is one of the most important factors for success in agriculture. This size is approximately measured by the number of acres, when dealing with any given type of farming. There were some celery, lettuce and onion farms on muck land. Ten acres of such land represents as large a business as 100 acres of land devoted to general farming. The following results are for hay, grain, potato, stock and dairy farms:

Size of farm related to profits.—In Tompkins county the average owner, with less than 61 acres, made considerably less than hired men received. The average farmer with 61 to 100 acres made about the same as hired men. Those with over 100 acres averaged much better than farm wages. (Table 1.)

TABLE 1. SIZE OF FARM RELATED TO PROFITS. 586 FARMS IN TOMPKINS COUNTY OPERATED BY OWNERS.

Acres.	Number of farms.	Average size (acres.)	Labor income. *
30 or less	30	21	$168
31 to 60	108	49	254
61 to 100	214	83	373
101 to 150	143	124	436
151-200	57	177	635
Over 200	34	261	946
Average	....	103	$415

*If a farmer's labor income is $500, it means that as a result of his year's work he has made 5 per cent interest on his capital and has cleared $500 above all farm expenses, besides having the use of a house and such farm produce as the farm furnished for consumption in the house. This figure can, therefore, be compared with wages paid to a hired man who is given a house, garden, etc.

The tenants on the larger farms also make considerably more than those on small farms. The size of farm does not seem to affect the landlord's profit.

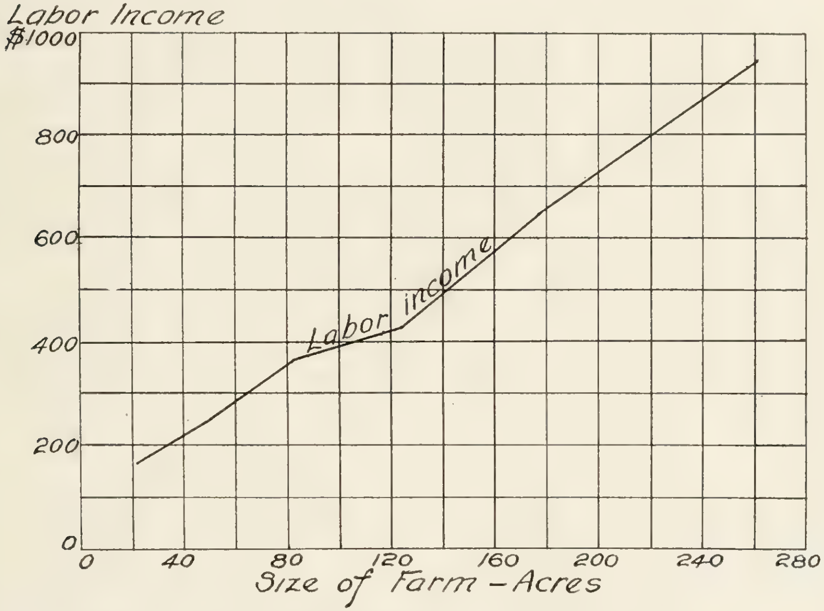

Fig. 1.—The larger farms pay much better than the smaller ones.

Table 2 shows similar results for Livingston county. Again the largest farms pay much better than the small ones. One might think that the farmers on the small farms could not own more land if they desired. But from table 2 it will be seen that no larger proportion of the small farms are mortgaged than of the large ones. Most of the farmers on the small farms could own more land if they wished to go in debt for it.

TABLE 2. SIZE OF FARMS RELATED TO PROFITS, 293 FARMS IN LIVINGSTON COUNTY OPERATED BY OWNERS.

Acres.	No. farms.	Avg. size, acres.	Avg. labor, income.	Mortgaged.	
				No.	Per cent.
30 or less	15	20	$64	4	27
31 to 50	24	44	307	9	38
51 to 100	95	79	376	35	39
101 to 150	89	125	650	36	40
151 to 200	32	173	997	9	31
Over 200	38	300	1,104	13	34

There is much discussion about farms being too large. Many persons who are not engaged in farming and some farmers believe that smaller farms would be better. All the figures that we have secured from these two counties, as well as figures from 178 farms scattered about the State, indicate that the larger farms are more efficient.

The fundamental cause for this change is the change from hand labor to the use of machinery. It seems, therefore, that larger farms are likely to be a permanent necessity so long as the present types of farming continue. Since more and more machinery is being used, it is to be expected that farms will continue to increase in size for some time.

This does not mean that large "bonanza" farms are to develop. We have no figures for such farms, as none of them exist in these counties.

The group of largest farms averages only 261 acres in Tompkins county and 300 acres in Livingston county. All the farms are the typical American "family-farm," on which the farmer and his family do the major part of the farm work. Even on the farms containing over 200 acres, the family does half of the farm work. These figures may, therefore, be taken as suggesting the most profitable size for a family farm. The larger farms seem to be better than the smaller ones for this purpose.

These figures do not throw any light on the desirability of the very large farm on which the farmer is so busy managing that he does not do any manual labor. From observation, we are of the opinion that such farms have many serious obstacles in their way. They are not likely to be able to handle labor effectively. The farmer who works with his men and directs them as he works, and who treats his hired men as equals, has a great advantage.

There can be no question but that the larger farms are paying better. But some persons may say that the difference is due not to the size of the farm, but to the farmer, and that the better farmers live on the larger farms. If small farms are the best size, it would seem as if the more intelligent farmers would choose them. If the more intelligent men all choose large farms there must be some reason for it. Certainly there must be some good farmers living on small farms. If the small farm offers the best opportunities, these farmers should be doing exceedingly well.

TABLE 3. SIZE OF FARM RELATED TO PROFITS, TOMPKINS COUNTY.

Acres.	Number of farms.	Per cent of the farmers making labor incomes of less than $401.	Per cent of the farmers making labor incomes of over $1,000.
30 or less	30	90	0
31 to 60	108	75	1
61 to 100	214	59	4
101 to 150	143	53	12
151 to 200	57	42	28
Over 200	34	29	32

TABLE 4. SIZE OF FARM RELATED TO TENANT'S LABOR INCOME AND LANDLORD'S PER CENT. 154 FARMS OPERATED BY TENANTS, TOMPKINS COUNTY.

Acres.	Number of farms.	Tenant's labor income.	Landlord's per cent.
100 or less*	58	$381	7.6
101 to 150	64	359	9.3
151 to 200	21	430	8.0
Over 200	11	650	7.0

*There were only eight farms of less than sixty-one acres. These are all included with the group of 100 acres or less.

Of 138 farmers on farms of less than 61 acres, only 10 made a labor income as high as $600. Of 234 farmers with over 100 acres, 79 made over $600.

Of 138 farmers on farms of less than 61 acres, only one man made a labor income of $1,000. Of 34 farmers on farms of over 200 acres, 11 made over $1,000 labor income.

Why the largest farms are most profitable.—Small farms have many disadvantages. A large part of the farm work cannot be done economically without at least two men. Many of the smaller farms do not have enough work to keep a hired man profitably employed. The cost of labor per acre is excessive on small farms, also the cost of horse labor. The cost of producing crops on the small farms is also increased because of the lack of machinery.

Labor cost and size of farm.—The receipts per acre are more on small farms than on the larger ones, but the single item of labor cost is so great that it more than offsets the difference in receipts. Other expenses are also more per acre on the small farms.

TABLE 5. SIZE OF FARM RELATED TO RECEIPTS, EXPENSES AND LABOR. FARMS OPERATED BY OWNERS, TOMPKINS COUNTY.

Acres.	Average size (acres).	Receipts per acre.	Labor cost per acre*.	Receipts minus labor per acre.	Other expenses and interest per acre.	Net profit per acre†.	
30 or less	21	$26.14	$19.90	$6.24	$13.76	loss	$7.52
31 to 60	49	14.24	8.10	6.14	7.61	loss	1.47
61 to 100	83	12.49	5.60	6.89	6.32	gain	.57
101 to 150	124	11.56	4.54	7.02	6.13	gain	.89
151 to 200	177	10.89	3.92	6.97	5.22	gain	1.75
Over 200	261	10.93	3.33	7.60	5.22	gain	2.38

*Total amount paid for labor, value of board of labor, value of unpaid labor by members of the family, and the farmer's labor estimated at $326 for the year.

†Profit after deducting expenses, interest on capital at 5%, and all labor as defined above.

TABLE 6. SIZE OF FARM RELATED TO LABOR. 586 FARMS IN TOMPKINS COUNTY OPERATED BY OWNERS.

Acres.	Area farmed per $100 worth of labor.*
30 or less	5 acres.
31 to 60	12 acres.
61 to 100	18 acres.
101 to 150	22 acres.
151-200	26 acres.
Over 200	30 acres.

*Total labor cost includes wages paid, board of labor, value of unpaid labor by members of the family, and $326 for the labor of the farmer.

If the farmer's labor is worth $326, which is the average value placed on it by the farmers in Tompkins county, then there is a net loss of $1.47 per acre on farms of 31-60 acres, and a gain on the larger farms. (Table 5.)

The area that is farmed with $100 worth of labor is six times as great on the largest farms as on the smallest (Table 6). Six times as much labor increases the receipts by only two and one-half times. With each group of farms the farmer's labor income is about twice the value of the labor that he directs, that is, twice the value of all labor except his own (Table 10).

Number of horses and size of farm.—Table 7 and figure 2 show how the number of horses increases with the size of farm. Colts are not included with horses. The figures are for horses old enough to work. The farms of less than 30 acres average 1.4 horses per farm. Three or four horses are the smallest number that can be used efficiently with modern machinery. The farms of 151 to 200 acres are the smallest ones that have an average of four horses per farm.

TABLE 7. SIZE OF FARM RELATED TO HORSES. 586 FARMS IN TOMPKINS COUNTY OPERATED BY OWNERS.

Acres.	Average size (acres).	Average number of horses.	Acres per horse.
30 or less	21	1.4	15
31 to 60	49	2.3	21
61 to 100	83	2.8	30
101 to 150	124	3.4	37
151 to 200	177	4.3	41
Over 200	261	5.3	49
Average	103	3.1	33

The figures of acres per horse are still more striking. The small farms have not enough horses to make efficient teams, and yet they are over-supplied with horses compared with their area. On these farms there are only 15 acres per horse. On the largest farms one horse farms three times this area, with no resulting decrease in crop yields. When we consider the cost of keeping a horse, we see what a great advantage the larger farms have.

The substitution of horse power for man power is the most striking feature of American agriculture. One horse properly directed can do the work of ten men. According to the United States census, the area farmed per man has increased one-third in the past twenty years. This increase has been due to the use of more horses per team. The area farmed per horse has not changed, but the farmer is using one-third more horses per man and has increased the acreage that he could farm in the same ratio. At the same time the crop yields of the country have increased.

TABLE 8. SHOWING THE INCREASE IN AREA AND HORSES PER MALE WORKER, FROM THE UNITED STATES CENSUS.

	1880.	1890.	1900.
Average acres per male worker	23.3	27.5	31.0
Average number horses per male work er	1.7	2.2	2.3
Average number of acres per horse	13.5	12.4	13.5

The most striking examples of the use of four to six-horse teams is in the middle west. In some cases, as in Iowa and Missouri, this has resulted in a decrease in rural population. At the same time, total production has increased. One man is often farming as much land as two men farmed a few years ago and doing it better.

Farm machinery and size of farm.—The value of farm machinery increases rapidly with the size of the farm. This value is only $341 for farms of 61-100 acres. These valuations are probably not half what new machinery would cost. Any one who has ever made a list of the necessary farm machinery will see at once how inadequately these small farms are equipped. Yet their machinery costs nearly twice as much per acre as that on the larger farms that have nearly three times as much machinery. Machinery can be used more effectively on large farms. One mower, one hay rake, one tedder, one hay loader, one corn harvester, one grain harvester, one grain drill, one manure spreader, one potato digger, one potato planter, can do their work on a 250-acre farm as readily as on a small farm. Few of the small farms have half of these tools. If a small farm does have nearly all the list, it cannot use them enough to pay for the investment. The more efficient and numerous machines become, the larger our farms should be. It is interesting to notice how many of the tools are of very recent development. Almost half of the value of farm machinery on a well-equipped farm is invested in machinery that has been perfected in the last few years.

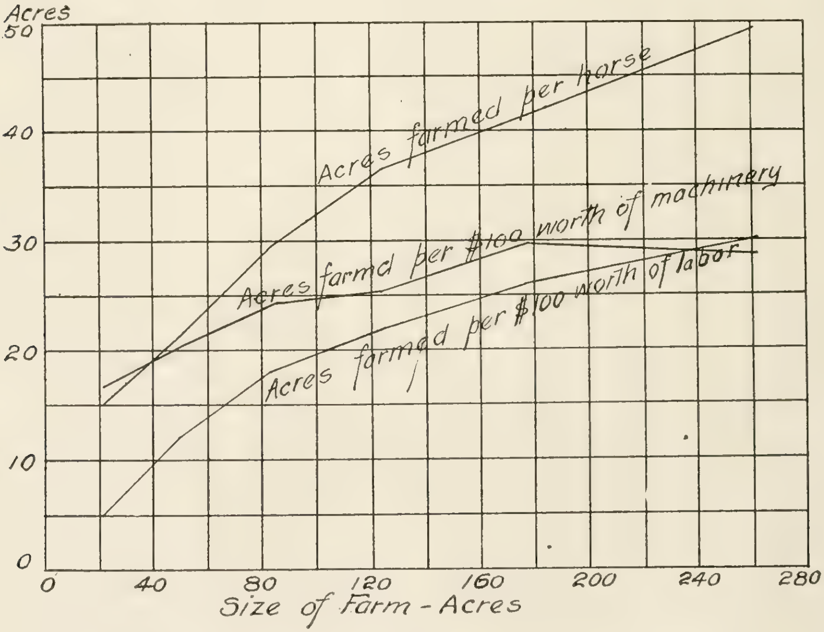

Fig. 1—The larger farms pay much better than the smaller ones.

TABLE 9. SIZE OF FARM RELATED TO MACHINERY AND TOOLS. 586 FARMS IN TOMPKINS COUNTY OPERATED BY OWNERS.

Acres.	Average size (acres.)	Value o machinery and tools.	Acres farmed with $100 worth of machinery and tools.
30 or less	21	$125	17
31 to 60	49	243	20
61 to 100	83	341	24
101 to 150	124	495	25
151 to 200	177	592	30
Over 200	261	914	29
Average	103	$407	25

In each of the groups the farmer's labor income is almost the same as the value of his machinery.

TABLE 10. SIZE OF FARM RELATED TO OTHER FACTORS. 586 FARMS IN TOMPKINS COUNTY OPERATED BY OWNERS.

Acres.	Number of farms.	Average size (acres).........	Tillable area (acres).........	Capital	Value per acre...	Receipts	Receipts per acre.	Expenses........	Expenses per acre	Paid for labor....	Board of labor...	Unpaid labor except farmers....	Total labor except owners....	Acres per animal unit*..........	Tillable acres per animal unit.....
30 or less.............	30	21	18	$2,269	$93	$549	$26.14	$235	$11.19	$55	$6	$31	$92	4.3	3.7
31 to 60.............	108	49	38	3,358	51	698	14.24	249	5.08	32	10	29	71	5.3	4.1
61 to 100............	214	83	60	4,379	43	1,037	12.49	367	4.42	67	22	50	139	6.8	5.0
101 to 150............	143	124	88	6,625	41	1,433	11.57	561	4.52	135	47	55	237	7.6	5.4
151 to 200............	57	177	117	8,394	34	1,928	10.89	757	4.28	217	69	82	368	8.0	5.2
Over 200...............	34	261	160	11,258	32	2,853	10.93	1,240	4.75	373	82	89	544	8.7	5.3
Average, 586 farms.........		103	72	$5,421	$45	$1,238	$12.02	$474	$4.60	$109	$33	$52	$194	7.2	5.0

*All the animals are reduced to the basis of cows for comparison.

Apparently the efficiency with which the labor of men, teams and tools can be used is the important factor in making the larger farms pay better. The results on tenant farms also agree with these conclusions. The tenant who furnishes labor finds the larger farms more profitable. The profits of the landlord who furnishes no labor seem to be little affected by the size of the farm.

The same points are shown by studying table 11, for Livingston county. Men, horses and machinery are being much more efficiently used on the larger farms. In spite of the much larger acreage farmed per man and per horse on the larger farms, the crop yields are as good or better.

TABLE 11. RELATION OF SIZE OF FARM TO OTHER FACTORS. 293 FARMS IN LIVINGSTON COUNTY OPERATED BY OWNERS.

Acres.	No. farms.	Average size acres.	Acres per $100 of labor.	Acres per horse.	Acres per $100 of machinery.
30 or less	15	20	4.3	13.3	16
31 to 50	24	44	8.8	19.1	20
51 to 100	95	79	12.9	21.4	18
101 to 150	89	125	15.8	23.6	23
151 to 200	32	173	15.7	24.7	23
Over 200	38	300	22.7	30.0	35

Size of farm and profits related to distribution of capital.—The percentage distribution of capital is almost the same on each size of farm. The larger farms have a little larger proportion of their money invested in stock. The smaller ones have a little larger proportion in real estate.

The land is worth more per acre on the smaller farms, but the amount invested in horses, machinery and other items is also more per acre, so that the percentage of the capital in each item is not much different from that on large farms.

Some persons have thought that farmers would do better if they reduced the size of the farms and increased the equipment. They forget that the equipment and teams will then not be used up to their capacity.

On the farms in these counties the per cent invested in equipment is slightly larger on large farms than on small ones.

When we consider farms of any given size, the best paying ones have practically the same distribution of capital as the less profitable ones. Reducing the size of farm to increase equipment is not the way that the most successful farmers have followed. They have increased both the equipment and the size of farm.

Of farms of a given area, the more profitable ones have the greater capital, but this is not all invested in equipment. The distribution of the capital is nearly the same as on the less profitable farms. The additional investment is uniformally distributed in more land and better equipment.

Crop yields and size of farm.—The city man and the political economist at once ask what effect the larger farms have on the food production of the country. Apparently the crop yields are as good or a little better on the large farms than on the small ones. Certainly the small farms are not producing more per acre. In addition, much more of the food is consumed in the production, since more horses are kept per acre. The smaller farms seem to be too small for the best production from the standpoint of the city, as well as from the standpoint of the farmer.

TABLE 12. SIZE OF FARM RELATED TO CROP YIELDS. 586 FARMS IN TOMPKINS COUNTY OPERATED BY OWNERS.

Acres.	Average size (acres.)	Yields per acre.		
		Oats, Bu.	Potatoes, Bu.	Hay, tons.
30 or less	21	35	117	1.38
31 to 60	49	32	111	1.36
61 to 100	83	32	119	1.33
101 to 150	124	34	114	1.35
151 to 200	177	32	127	1.24
Over 200	261	35	113	1.24

TABLE 13. SIZE OF FARM RELATED TO CROP YIELDS. 293 FARMS IN LIVINGSTON COUNTY.

Acres.	Average size acres.	Acres per animal unit.	Yield per acre of:				
			Wheat, bu.	Oats, bu.	Hay, tons.	Potatoes, bu.	Beans, bu.
30 or less	20	5.0	18	39	1.21	92	18
31 to 50	44	6.3	19	40	1.58	98	18
51 to 100	79	6.1	19	41	1.49	116	18
101 to 150	125	6.6	19	42	1.53	108	16
151 to 200	173	5.8	19	47	1.39	1	17
Over 200	300	5.9	19	43	1.45	116	15

General conclusions on the size of farm.—Many farmers have enlarged their farms by purchasing additional land. Many others might well follow their example. A considerable number of farmers are not in debt and some also have money available. These persons should study the question of how well their horses, machinery and labor are being used. If a farmer is able to manage horses and machinery to good advantage, it may pay him to go in debt for additional land.

In considering this question we must also consider the probability of a continued increase in the use of machinery in the future that will give the larger farms a still greater advantage.

Sometimes it is very difficult to purchase land that adjoins one's farm. The line fence is one of the greatest obstacles in the way of agriculture. The farms are not well laid out, and it is often impossible to purchase so as to make a farm of satisfactory area and shape. It will sometimes pay to sell and buy where a satisfactory area can be secured.

Many owners have enlarged their acreage by renting additional land. Of the owners for whom a labor income was calculated, 14 per cent also rented land. This, together with the consolidation of farms by purchase, shows how many men recognize the importance of increased acreage. Eighty-six farmers who rented additional land owned an average of 89 acres and rented an average of 51 acres. This gave them 35 acres more than the area operated by the average owner, who did not rent. Their average labor income was $522, which is $115 more than the amount made by the average owner who did not rent. This method of increasing the area seems to be a very satisfactory one for those with limited capital. After a few years it is often possible to purchase more land.

TABLE 14. OWNERS RENTING ADDITIONAL LAND, TOMPKINS COUNTY.

	Number of farms.	Acres owned.	Acres rented.	Labor income.
Owners operating their own farms only	529	105	....	$407
Owners renting additional land	86	89	51	522

Nineteen per cent of the tenants rent farms from more than one landlord. Some others rent two farms of one landlord, so that over one-fifth of the tenants operate more than one farm.

Some farmers are not able to direct their own labor or that of a hired man effectively; probably the smaller the business the better for such persons. Some others do not wish to run a larger business because they wish merely a small home and can live on the means they now have. These remarks apply to those who desire to run effective farms.

The larger area brings increased risk as well as increased opportunity. Before buying more land one must consider his desires and his ability.

Best size of farm.—For greatest efficiency, a farm should be large enough to fully employ at least two men the entire year. One man is at a great disadvantage in many farm operations, and in case of sickness or other emergencies the disadvantage is still greater.

For general farming these figures show that a farm should contain at least 150 acres. The upper limit of area is determined chiefly by the layout. With ideal conditions, with the buildings in the center of the farm, and with a public road running past the buildings, as high as 600 acres may be run from one center. With more than this area, the distance of the fields from the buildings is usually too great. It is not often that one can secure so large an area well located with respect to buildings. The most profitable general farms in Tompkins and Livingston counties contain about 200 to 300 acres of good land.

THE MANAGEMENT OF CLOVER IN CORN BELT ROTATIONS.

(J. A. Drake, office of Farm Management, U. S. Dept. of Agriculture. Mr. Drake was a Missouri Farmers' Week Speaker.)

J. A. Drake.

Perhaps there is no section of the country where a permanent and well arranged rotation is of so great importance to the maintenance of the most profitable system of agriculture as in the corn belt section, of which a large part of Missouri forms an important part. In connection with the kind of farming carried out on the better class of farms, the crops that are grown, and the live stock kept, such a rotation is well-nigh indispensable. The yields, by ordinary methods of farming, cannot well be kept up, much less increased, without it; and especially is it essential in the continuance of high yields of corn, perhaps the most important and most valuable general farm crop that can be grown on the average farm. The disastrous effects of growing corn continuously on the same field for a period of years without some special arrangements for heavy manuring, growing rye, etc., is beginning to be quite well understood. Experiments have shown that a mere alternating of the crops, corn and oats, through a period of years will increase the yield of corn about one-half over that of one crop grown continuously through the same period, while the addition of clover, making a three-year rotation, has been known to increase the yield to almost three times that of continuous one-crop culture.

Not only is a rotation important in crop production on corn belt farms, but it is highly desirable in connection with keeping of most classes of live stock. Along with corn a certain amount of clover pasture and hay, or a substitute for them, must be furnished each year, and in no way can it be done with greater ease and with more certainty than to follow a regular rotation of which clover forms a part.

A regular rotation, likewise, adds system to the management of the farm. It is known definitely what is to be done each year. Each field gets its certain crop or certain special treatment in fertilizers or manures at regular intervals. This makes it possible to estimate the number of live stock that can be kept each year, and the general returns that may reasonably be expected from the farm.

Important as continued pursuance of a regular rotation is, no factor in it is so vital and gives so much trouble as the successful management of clover in the rotation. If there is a failure of this crop, then a profitable and suitable substitute must be found, or the whole field is left idle and the entire rotation deranged.

It was because of this important relation which the management of clover bears to the rotations generally practiced and the ever-increasing difficulty that farmers in general are experiencing in growing clover successfully that a careful and systematic study of the farm practices relating thereto was undertaken. The problem has been an interesting one indeed, and has revealed a great many factors not at first suspected.

Rotations including wheat.—Among the very common rotations found on the average farm of the section under consideration is one of which wheat forms a part. There has been for some time a tendency on the part of farmers to discontinue this crop wherever possible, but for the most part, even though it is considered uncertain and unprofitable, it is kept in the rotation because it is thought necessary or at least very desirable in getting a stand of clover.

Perhaps the most common of these rotations is that of corn, oats, wheat and clover. Another is that of corn, corn, wheat and clover. Again, another is corn, wheat and clover, this being only a three-year rotation. All of these find favor with individual farmers. It generally depends somewhat on local conditions as well as local customs as to which predominates. The first is the old rotation found on many general farms, while the second is found where it is desirable to produce more corn to feed a larger number of hogs. The third is a very useful rotation for building up a farm, especially when used in connection with a thorough system of fertilizing and applying manures.

In all of these rotations the clover is sown in the wheat. This is done at various times and in various ways. Every man has his own "best" time and method, by which he must proceed in order to be successful. Some sow their clover seed as early as February, while others wait until April with apparently equal success. There are still others who sow one-half of their seed early and the other half late and get very good results. Probably more farmers prefer to sow the seed rather early, either in February or March, being especially anxious to catch the ground in a "honey-combed" condition, or, if not in this shape, to sow on a light snow. There are many good features about this. The farmer usually gets the work done when otherwise not very busy. There is very little labor connected with the seeding, and thus there is very little invested in the crop except the seed. And, if conditions are right and everything favorable, a fairly good "catch" of clover is usually secured, but at best there is much uncertainty and a great deal of the element of chance in the average method of seeding clover which ought to be eliminated if possible.

When it is considered that for every other crop the farmer prepares a good seed bed, or at least he should, but that with clover sown in wheat it is nearly all haphazard and largely trusted to luck, we are at once impressed that a mere sowing of the seed on the wheat ground is not giving the clover a fair chance to grow and do its best. Especially does this practice become hazardous on lands that have been farmed for a number of years and have become exhausted in fertility and low in humus and vegetable matter. Under these conditions the soil becomes dead and lifeless, packs and bakes with dashing rains and sunshine, until it resembles a traveled road. There is little chance for the clover seed to become covered, or even if a foothold is secured, there is little hope of the young plants living.

During the progress of these studies it has been quite evident that as soil conditions change our methods of seeding clover with wheat must be changed and made more thorough. However, it is not an easy matter to introduce radical changes in present methods, with an equal assurance that farmers in general will be more successful. Nor is it the purpose of this work to urge too great changes in these methods, but to call attention to other practices which will make them more reliable and success much more certain.

Harrowing the wheat.—In nearly every community where these studies have been carried on one or more farmers have usually been found who make a practice of harrowing their wheat ground in the spring to insure a covering of the clover seed and hence a better stand. Some sow their clover seed and then harrow, while others harrow first and then sow the seed. Still others harrow, sow the seed and then harrow again to cover it. The question at once arises, will this harrowing injure the growing wheat? But the universal testimony of those who have tried it is that, especially during dry years, it is a great benefit to it. Wheat has been thoroughly harrowed as many as three times with good results. Again, will it injure the timothy sown the fall before? Some of the timothy thus sown will be torn out, but enough will live through at least two harrowings to give a sufficient stand of this crop. The clover is of so much more importance that it should have first consideration. The seeding of timothy can likewise be done in the spring with the clover.

In seeding clover after this method there is but one rule as to the time of seeding—wait until the field is in good condition to harrow. Men who follow this method begin seeding at the earliest possible moment, but are in no hurry, even sowing as late as the first of May. It is well not to put it off until the wheat gets so high as to interfere with the harrow, but sowing any time before this, if the harrowing is well done, practically insures a good stand of clover, unless the spring is abnormally dry. A good sharp harrow should be used and it should be sufficiently weighted, if necessary, to do effective work.

The greatest objection to this method is that the work must be done when the farmer is busy preparing ground for other crops, but in view of the great value of clover as a soil renewer and soil builder, together with its great importance in the rotation, this measure of uncertainty in securing a good stand cannot be urged too strongly on farmers for their careful consideration. At least this method should hold an important place as a supplement to those already in use. For instance, where it is the practice to sow seed early, and if for some reason, as it often happens, it is discovered later that there is a very inferior stand, then more seed should be sown and harrowing resorted to. No farmer who is keeping apace with his business can afford to let a single year pass with a failure to get a good stand of clover.

Using a disk or shoe drill.—In some places men were found who were using their disk drills to great advantage in sowing clover in their wheat. A few shoe drills were also used with equally good results. In using the drill for this purpose they sow the seed with the seeder, placing it in front of the grain box, or with the new type of drill they allow the seed to go down through the grain tubes and be covered slightly. This is a very effective method of getting a fine stand of clover and it does the wheat little or no harm. There is a difference of opinion among farmers as to which way the drill should be driven when putting in the clover. Some say it should go the same way the wheat is drilled, while others contend it should go across the wheat rows. Since both ways are quite generally practiced, it is very probable that either one will do very little damage to the wheat crop. Care should be taken not to force the drill into the ground too deep. All in all, the method seems to be a very commendable one which should find a prominent place in general farm practice.

Top dressing the wheat with manure.—Under normal conditions on farms where an abundance of manure is produced, rightly cared for and applied to the land at regular intervals, there is very little known about any difficulties in managing the clover crop successfully. No matter how the manure is applied, when, or to what crop, good stands are nearly always secured, which grow on to maturity without much attention or consideration on the part of the farmer; provided, of course, his soil conditions, such as drainage, lime content, etc., are otherwise favorable. Such is the case especially after several years of this kind of farming. It has been quite noticeable during these studies that on good live stock farms, where the manure was properly handled, and especially in dairy sections, very little was heard of so-called "clover sickness," poor stands, etc., while on grain farms, where everything has been sold off for a number of years and wasteful methods of burning stalks and trash have been practiced, the failures have been numerous and the clover troubles are increasing at an alarming rate. This last condition exists in sections where they have formerly grown clover very successfully by their present methods of management.

When the soil has become badly run down manure will doubtless do most good when applied as a top-dressing on the wheat in which the clover is to be sown. The effects of this have been noticed in a small way on nearly every farm. Most farmers have had the experience of "doctoring up" a few of the poor knolls with a light top-dressing of manure, and upon going back the next year to observe, they have usually found that there was the best stand in the field and the best clover growing. This, too, occurs where there would otherwise have been scarcely a plant of clover, or very little at most without the top-dressing. Just such a condition as this is shown in the illustration on the next page (Figure 1).

This illustration is a reproduction of a rather remarkable condition. It will be noted that the line between a very fine stand of clover and no clover at all is very marked. This line is the boundary between manure and no manure. The seed, of course, was sown over the entire field alike. A much better growth of clover could not be secured under any circumstances than was found where the manure was spread; whereas, where there was no manure, nothing existed but a very poor growth of timothy, a few stunted weeds, sorrel,* and bare ground, the bare white ground predominating.

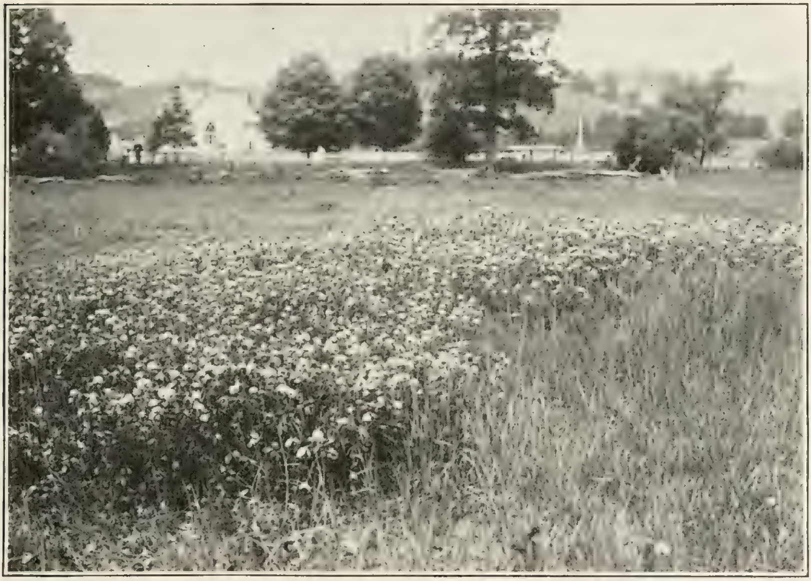

Fig. 1 The effects of a light top dressing of manure.

Where the manure was spread it was very noticeable that all of the sorrel had disappeared and nothing but clover grew. The clover had so thoroughly taken possession of the soil that the sorrel had been completely smothered out, proving that the smothering out process is one and possibly the only successful way of getting rid of sorrel. Anything that makes clover or other crops grow so thickly and so

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*It might be well to state that in some sections sorrel (*Rumex Acetosella*) is not common. It is found in great abundance, however, in the eastern and southern part of Ohio, and seems to be most abundant on soils of shale and sandstone origin. It is usually considered as indicating the lack of lime. This, however, should not be understood to mean that an application of lime will kill it, except as it might cause clover or other dense-growing crops to grow more vigorously and smother it out. It has been found growing vigorously in the edge of a pile of pulverized limestone. Sorrel should not be taken as an absolutely certain indication that an application of lime is entirely necessary for the growing of clover without some further investigation along this line by experimenting with lime itself. The other factors, such as methods of seeding, applying manure, etc., which are being set forth in this circular, ought to be studied also in this connection.

vigorously that the sorrel cannot exist will kill it out. In this case the top-dressing of manure has accomplished this result completely by producing a perfect stand and maintaining it.

To the right of the picture will be noted a narrow strip of clover which dwindles out to almost nothing. If the picture had been extended a little further to the right it would have shown a narrow patch of clover which gradually disappears and which marks the path of the farmer as he was driving away from the scene of action, and some of the manure sifted down through the "dump boards" or rough wagon bed in which the manure had been hauled. As far as this sifting process continues the clover follows the path of the wagon, but as the manure gives out the clover entirely disappears.

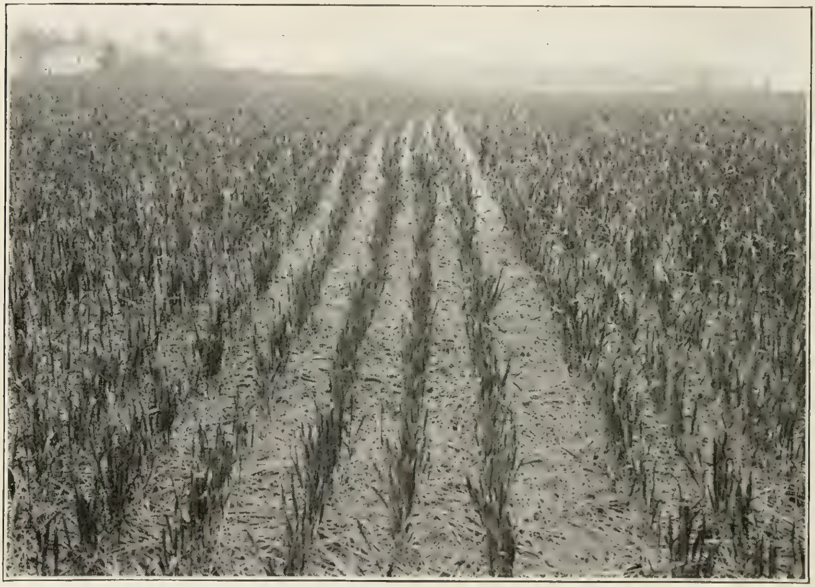


Fig. 2. A covering of straw spread on wheat ground after seeding. The purpose of this is to insure a stand of clover.

This very pronounced condition found on a poor knob of a run-down farm is an eloquent appeal for the continuance of live stock and more manure, better cared for and applied. One farmer was not far wrong in his answer to the question often used in making these studies, "Do you have any trouble in getting a stand of clover?" when he replied, "Not since the manure spreader came on the farm." It is needless to say that he top-dressed all of his wheat ground carefully whenever he expected to sow clover. It might be added that in general practice this is done immediately after the wheat is sown in the fall, or during the early part of the winter.

Spreading straw on wheat ground.—A very interesting and unusual practice in connection with the management of clover in rotations, including wheat, is to spread straw evenly over the surface of the soil after the wheat is sown and before it comes up. In the absence of suitable straw spreaders the farmers haul the straw out in small piles and spread it by hand. On the poorest spots whatever manure is available is used, but on the remainder of the field straw is spread with as much care as though the work is being done on strawberry beds. The preceding illustration gives an idea of such a coating of straw through which wheat has come up, as well as the appearance of a field in which this practice is carried on.

This unique practice is found in a section where clover growing in a wheat rotation is a very uncertain undertaking indeed. In these localities the best farmers are resorting to this method as apparently the last extreme. This is necessary to grow clover and be at all successful. Those who consider this practice not worth while or too laborious have about quit trying to grow the crop at all, so numerous and constant have been their failures. The soils on which these conditions are found have been farmed for a great number of years with no thought or provision for keeping up the humus and decaying vegetable matter, and as a result, the surface has become so hard and lifeless that without some special provision like the covering of straw or manure the young clover plants cannot take root and maintain themselves sufficiently to give anything like a satisfactory stand. The photograph was taken about May 1st, and wherever there was a slight covering of straw, something to give some protection and hold the moisture slightly and prevent the ground from baking, there the young clover plants were to be found in great numbers and growing with great vigor. But where there was no straw and the soil was bare, in no case was clover found growing. On this farm the clover seed was sown at any time in March when it was thought that the conditions were right. No special attention was given. The seed was sown broadcast, as it is usually done by farmers. During the past summer the writer has had occasion to visit this farm again after a lapse of about three years, and better success with clover every successive year is reported. A failure has not been experienced for some twelve years. This is extremely interesting, as other farmers in that section have failed to get good stands unless it is by this method or by the scattering of manure, which is, of course, as good or better. That this man is successful in growing clover by this method is shown by the accompanying photograph, Fig. 3, which was taken on adjoining fields similarly treated the year before.

The practice of spreading straw in order to get a stand of clover is not so valuable as something to be recommended to farmers to practice, as it is in what it teaches. It may be objected at once that it is a mulch, and true, it is. It may also be objected that it is an expensive practice from a labor standpoint. Whether this is true or not may be judged from the fact that the man and his hand were able to haul and spread the straw over three acres per day. If suitable straw spreaders were at hand this labor might be materially reduced, but as it is and under the conditions found it is time well spent. The practice, however, is worthy of very careful consideration and study. It is found on land where clover had once been grown without any difficulty whatever, but years of farming has brought the soil to that state where a mere thin scattering of straw on the surface will insure a perfect stand of clover, while without it, or some substitute like manure or the equivalent of trash, leaves, etc., clover cannot be grown. The natural drainage is good. Commercial fertilizers have been used abundantly for years, and there should evidently be no lack of the elements essential for plant growth. There is no lack of lime, the soil in fact being for the most part of limestone origin. But under these conditions it lacked what proved to be a most essential factor to success in clover production, namely, something that will have an effect probably similar to that of an abund-

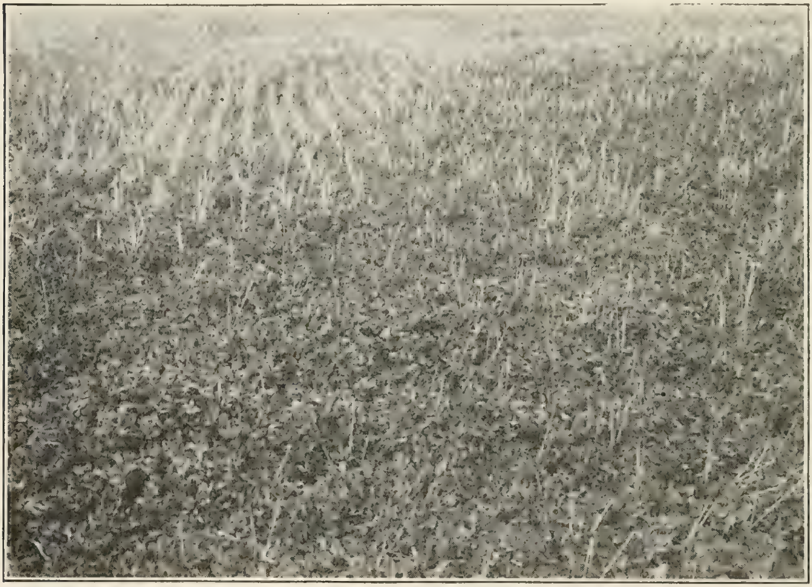


Fig. 3. Stand of clover secured under very unfavorable conditions, by applying straw to the field as in figure 2.

ant supply of humus and vegetable material incorporated in the soil. It is not the intention to advise this method of applying straw to wheat ground as a general practice, but merely to call attention to the wonderful effect it has had and to bring out the fact that to grow clover on such soils it is necessary to do something for it that will enliven it, cover more seed, prevent baking and cracking, and conserve the moisture. It might be well to add, also, that it suggests a much better means of disposing of straw and stalks than burning or selling them on the market, and it ought to give the average farmer a glimpse of the extreme value of the accumulation of any vegetable matter, such as straw, stalks, trash or leaves, especially on the surface of the soil, in connection with getting a stand of clover.

It would seem very probable from this that a condition might arise wherein the extreme lack of humus and organic matter is the principal and perhaps the only element of failure with the clover crop. How prevalent this condition is, investigations have not been carried far enough to say. But farmers, in limestone regions especially, may well consider the humus problem as one of their important factors in clover growing. The extremely unfavorable condition for young clover on a hard, compact, run-down soil is something that can not easily be overestimated. The tendency has been in the past to ignore the great value of humus and organic matter in the production of profitable crops of any kind, and it is very probable that the increasing amount of clover failures on soils that have been farmed for a great many years is due to the gradual but certain exhaustion of humus and vegetable material, which constitutes one of the greatest factors of the soils' physical make-up.

The adoption of better methods of farming and of rotations containing special features for supplying to the soil an abundance of humus-forming material would doubtless soon put an end to much of the failure with clover in a corn and wheat rotation over a large part of the section where such failures now occur. This, together with better and more careful methods of seeding, and a better preparation of the surface of the soil, which has already been discussed, seems especially advisable. The seed must be covered by one means or another, and the surface of the soil should be either thoroughly pulverized or have an abundance of humus or a temporary substitute for humus in the form of a mulch or covering on the surface. Unless these conditions are supplied the young clover plants can not get a foothold and maintain themselves in their earlier stages of growth. If the surface of the soil is too hard and dries out too readily the young clover nearly all dies out before it gets even a fair start. This fact seemed to have been greatly overlooked by the great mass of farmers. The physical condition of the soils on many farms is continually growing worse. They are becoming more lifeless and less friendly to young clover from year to year.

Farmers are urged to consider its importance and to do all in their power to correct the evil. The hard, compact condition of the surface soil in the spring, with its tendency to bake and dry out, must be overcome. Supplying humus and vegetable material as rapidly as possible will accomplish this result. As this is done perhaps one of the most common causes of clover failure will be removed. Until this is done there will be great need of pulverizing the surface and breaking up the surface crust by the use of some such implement as the harrow or drill.

Rotations containing cowpeas and soybeans preceding wheat.—In the southern part of Ohio a very interesting practice was found. Some of the farmers have adopted rotations in which cowpeas or soybeans come in just before the wheat crop. It is the usual practice to make the crop into hay in time to have the ground ready for fall seeding, but occasionally the entire crop of cowpeas or soybeans is rolled down and crossed with a disk in the preparation of the ground for wheat. By using a disk drill the wheat can be sown without any inconvenience because of the litter on the surface of the soil. The accumulation of cowpea and soybean vines on the surface of the ground serves as a mulch very much on the order of the straw just discussed, and is very helpful in getting a stand of clover. In fact, it only emphasizes again the great value of some accumulation of vegetable matter on the surface of the soil to keep it in better condition for the growing of the young clover plants. The nitrogen furnished by these crops is also a great stimulus to the wheat as well as the clover throughout its growth. The practice of turning the entire crop back to soil, however, is somewhat wasteful. If it could be so arranged as to have the peas and beans ripen early enough it would be better economy to gather them with hogs, thus allowing only the vines to fall back to the soil. This would accomplish the same results in reference to the stand of clover, besides getting the value of the crop in pork.

Rotations including rye.—Rye is becoming more and more popular as a crop in the rotation in which clover is sown. It has some points of advantage over wheat in that it grows taller and less dense and does not shade the clover so much as wheat. The methods of seeding clover in rye are much the same as in wheat. The seed is sown in the spring by the usual methods. Harrowing the rye can be resorted to the same as on the wheat crop. Farmers have also been found who use a disk drill and even a disk harrow in breaking up the surface of the soil so as to secure a covering for the seed when sown in the rye crop. The use of a disk harrow can be resorted to on rye, but it is rarely ever done in connection with wheat. Even with rye it should be set straight so as not to do much damage to the rye crop. If this is not thought desirable or possible the seed may be sown and hogs turned in for early spring pasture. The tramping of these animals over the field will plant much of the seed in the ground and make a good stand more certain. A top-dressing of manure or a covering of straw can be used with the rye the same as with wheat. The use of a good commercial fertilizer on rye, the same as on the wheat crop, will often prove very beneficial in securing a good stand of clover, and in the absence of manure, the value of which has already been discussed, the use of a good commercial fertilizer is very commendable. This will often insure a good crop of clover where otherwise there would be a failure.

The rotations followed, which include rye, are usually on the same general plan as those including wheat. These are usually corn, corn, rye and clover, or corn, rye and clover. Some of the potato growers have a rotation of potatoes, rye and clover, running it as a three-year rotation, while others run it as a two-year rotation, clipping the rye and clover about three times but taking no crop off. The next year, then, potatoes are planted after the clover has had time to make some growth in the spring, for what is called the late crop of potatoes. In a similar manner a two-year rotation of rye and potatoes can be practiced, and the rye hogged down when ripe, the clover being sown in the rye in the spring and allowed to grow up before the ground is plowed for potatoes the next year.

Rotation with oats.—Some farmers run a rotation in which oats is the only crop in which the clover is sown. Such rotations are usually corn, corn, oats and clover, or corn, oats and clover. With these rotations failures in securing stands of clover are rather numerous, but some men are quite successful in the management of the clover crop even under these circumstances.

If a good stand of clover is particularly desired, one of the first things to be avoided is a very heavy seeding of oats. Lighter seeding will probably cut down the yield of oats somewhat, but the chances of a catch of clover will be very much greater. Not over a bushel and a half of oats per acre should be sown, whereas it is generally the custom to sow from two to two and a half bushels per acre. Oats at best is a bushy crop and produces a very dense shade under which the clover is not likely to thrive. Then, too, when the oats crop is taken off the clover is exposed to the sun very suddenly, and sometimes damage is done in that way; especially is this likely to happen where the shading has been very heavy. However, with proper methods of seeding and watching this one point, very satisfactory stands can quite frequently be secured in oats.

Rolling the oat field after the clover seed has been sown is considered by many farmers to be of great importance. This covers the seed just about deep enough and firms the surface of the soil in such a way as to insure a good moisture supply to the young plants. Some prepare the ground and sow the oats with a drill, and the clover with the grass seeding attachment, allowing the seed to fall back of the hoes or disks. The roller is then run over the field. Others sow the oats either with the drill or broadcast, using the roller to cover the seed. The beneficial effects of the roller on the clover is very marked where the soil is in fit condition for rolling. It usually insures a good stand which is quite uniform on the ground.

Another very good method of seeding with oats is to sow in stalk ground and allow the stalks to remain on the surface of the soil. This, again, is only a repetition of, and brings again to our notice, the value of the accumulation on the surface of the soil of some protection in the form of vegetable matter, which will prevent the baking and drying out of the soil. In doing this the stalks are usually broken down and the ground disked, after which the oats are sown and disked in. If the stalks are not too large and are well cut up a disk drill can be used, but the former method is most generally practiced. The clover seed is sown after the seeding of the oats, and the roller in this case also should be used. This, together with the great protection which the stalks furnish, practically insures a good stand. A great many farmers have been visited during these investigations who follow this method exclusively and very rarely fail. The following illustration shows a field which has been sown after this method, although the rolling was omitted:

In the field shown in the following illustration it was very noticeable that wherever there was a slight accumulation of stalks or corn husks on the surface to hold the moisture and serve as a slight shade and protection, the young clover was getting a much more vigorous start than it was in the open ground, where exposed to the full force of the wind and sunshine. The folly of raking and burning such litter, as is sometimes done, should be at once apparent. Not only is it greatly needed in the soil, but as a surface protection for the clover crop its value cannot be too highly appreciated. The accumulation of litter in the way

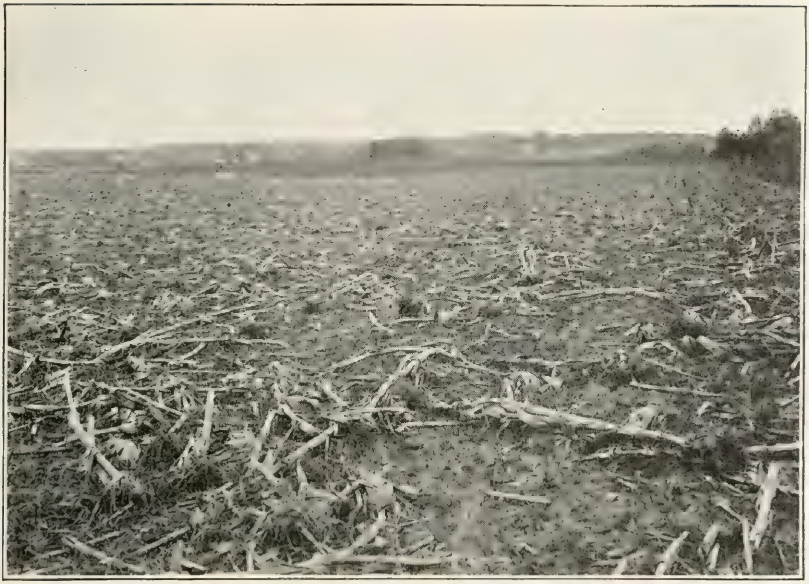


Fig. 4. Stalks on surface of field sown to oats and clover.

of stalks, straw, manure, etc., on the surface of the soil in getting a stand of clover should be considered as something of vital importance by all farmers.

Rotation of corn and clover only.—Only a few instances of corn and clover rotations have been encountered. These were usually corn, corn and clover, or two years of corn and two of clover. The clover in such rotations is either sown in the corn at the last cultivation or by itself in the spring without a nurse crop. Both of these methods have several objections for the use of the average farmer. The first one, seeding in the corn at the last cultivation, is under ordinary conditions very uncertain. However, on rich black soils, some farmers were found who, being especially careful to have their corn ground in "onion bed" condition at that time, were very successful, rarely ever missing a stand of clover. But on average clay upland soils and with the cultivation the average corn field receives, especially in a dry year, seeding in the corn is a very uncertain undertaking indeed. Such a method cannot be advised for the average farmer except as he experiments with it in a very small way and finds out what results he may expect.

As for the second method of seeding in the spring without a nurse crop, in some sections they have found that it is a very certain method of getting a good stand of clover. However, it is not to be advised on fields which are badly infested with weeds, unless provisions are made for one clipping. If the conditions are favorable in this respect, and the seed is sown rather early in spring, even after one clipping, a good crop of hay or seed can usually be cut sometime during August or early September. If hay is cut and the crop not allowed to go to seed the field can be left in clover another year.

Lime applied in the rotation.—Without the presence of a certain amount of lime in the soil, no matter what the rotation may be or how thorough the method of seeding, the clover crop will not do well. Most soils, however, in limestone and limestone-glaciated regions, usually have an abundance of this element to grow clover successfully. But again, there are other soils, such as are found in sandstone and shale regions, which were not abundantly supplied with lime in the beginning or in their virgin state. When such soils have been farmed for many years the numerous crops, and more particularly those of clover, have drawn heavily on this supply and in many instances have reduced it to the point where a full crop of clover cannot be grown. In extreme cases, even though manure be applied, it will produce perhaps only a half crop or less as compared with the same land on which lime is supplied with the manure, or preferably in advance of it. Nothing can take the place of lime in some form where lime is really needed, and there seems to be no way out of it but to apply the lime to the soil.

This condition, however, may vary on different farms in the same community on the same soil formation, depending on the treatment given and the kind of farming carried on in the past. It is always well, therefore, to make sure that this need is apparent, and the only test which a farmer should consult in this is to make an application of lime on small sections of a field at different rates (perhaps a half ton, a ton, and one and a half tons per acre) and see for himself whether it produces an increased growth. If ground limestone is used in place of lime the amounts should be doubled. If it gives results then it is safe to plan for further and more extensive applications to the rest of the area that is in a similar condition, at the rate indicated as necessary by the test. If, however, the results cannot be detected between the clover where the lime was applied and where it was not, even at the heaviest rate, it is fairly good evidence that it will not pay to use it. If it is found unprofitable it is poor business to use it, but if it is found that lime is really needed it is likewise very poor business not to use it, and its application should not be delayed.

After the first preliminary experimenting with lime to ascertain its value, in general practice it is best to apply lime on the corn ground, whether the rotation is that with wheat, rye or oats for a nurse crop.

The same is true if the clover is sown in the corn at the last cultivation or following corn the next spring without a nurse crop. When the lime is sown in the corn the cultivation of this crop stirs it into the soil in a very thorough manner, more so than would be the case if it were applied when the ground is being prepared for the wheat, rye or oats crop. Lime, however, can be applied at this time with good results, provided it is not convenient to do so on the corn ground.

Value of clover in the rotations.—No rotation is complete without clover. It is the crop that supplies nitrogen to the soil, the most expensive element when it is bought in the fertilizer sack. Clover brings up the mineral elements, phosphorous and potassium, from the sub-soil, and stores them in the large surface roots and crowns to be used later by other crops. It has been estimated that a good crop of clover on one acre has in its roots and tops elements of fertility equal to that contained in ten tons of manure, the roots alone containing about one-third to one-half of that amount. It is extremely important to keep the soil well supplied with humus and decaying vegetable material, and this the clover crop does by filling it with an immense root system. The value of this feature it is not an easy matter to estimate.

Farmers in general are apt to continually underestimate the full significance and the extreme importance of this crop. However, its real and immediate value is so great, and its continued success means so much in keeping up the rotation, and the rotation so much toward keeping up a continuous and profitable system of farming, that every effort should be made and every means applied to make sure that each year there will be success in growing clover and maintaining the rotation as planned.

SUMMARY.

On the average farm success in maintaining a profitable system of agriculture hinges very largely on keeping up a systematic rotation.

No rotation is complete without clover or some legume as a substitute for it. Hence the importance of continuous success with clover.

Continued success with this crop is a very broad problem. Failure may be due to one or more of a number of factors. Assuming that the land is well drained, and that a liberal amount of seed is to be sown, the following is of extreme importance:

The method of seeding.—The seed must be covered; the soil at seedtime must be in condition to insure this, and if not, the conditions are not favorable for germination and for the young clover plants taking root. If the common method of sowing on "honeycombed" ground or on the snow, in winter grains, does not afford this covering, a seed bed should be prepared by the use of a harrow, disc drill or even a disc harrow. The seed will thus be covered and moisture conserved to insure further growth. It may be necessary under some conditions to sow clover in the spring without a nurse crop, and after a careful preparation of the seed bed.

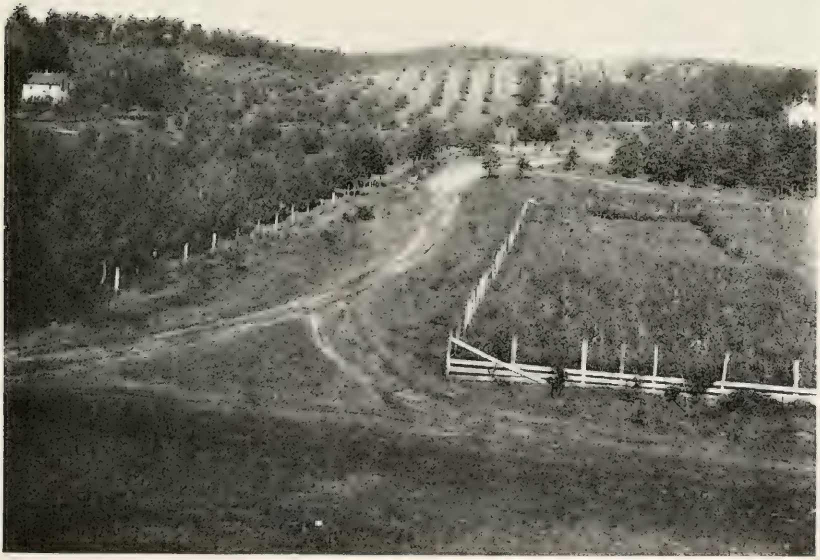
The top dressing of manure.—With only the ordinary method of sowing clover on the frozen ground or on snow, even on some of the poorest lands, a top dressing of manure will most generally insure a good stand. (See Figure 1.) On run-down lands, and where only a limited amount of manure is available, this is doubtless one of the best ways in which manure can be utilized.

A mulch of straw.—(See Figure 2.) When sufficient manure is not available, a mulch of straw will prove very effective. If there is a slight covering of straw, leaves, stalks or other vegetable matter on the surface of the soil, it will usually insure a good stand of clover and maintain it throughout the season. Such a covering holds moisture, prevents undue baking and cracking of the soil and is a great protection to the young clover crop. (See Figure 3.)

Humus and vegetable material in the soil.—The depletion of organic matter in the soil, and its immediate effects, is doubtless responsible for many of the increasing clover failures. In its absence the soil becomes compact and lifeless, crusts and cracks, and moisture escapes very rapidly, thus furnishing a very unfavorable condition for the growth of clover in its early stages. Most soils when new, and as long as properly handled thereafter, have an abundance of vegetable matter in them, and little difficulty is experienced in getting a stand of clover, but with years of continuous cropping this becomes used up and a change takes place in the soil, very largely due to this fact, which makes clover growing more and more uncertain. A decided effort should be made to correct this deficiency.

Lime.—Most soils have sufficient amounts of lime to insure a good growth of clover if other conditions are favorable, but some soils are naturally low in their lime content. On such soils many years of cropping sometimes reduces this lime to a point where a profitable crop of clover cannot be produced. Short cut methods of trying to find out whether lime is needed should be avoided by farmers in general. The surest and safest way for the average farmer to find out whether his fields need lime is to apply lime to a small area and watch the results on the clover as compared with no lime. Sorrel should not be taken as a certain indication that lime is needed. It will grow in the presence of an abundance of lime. Applying lime will not kill it out, but a rank growth of clover or some other similar crop will usually accomplish this.

When a farmer begins to experience failure with clover, he should avoid jumping at conclusions and saying that any one factor is the cause. It is a broad field for him to think upon and to work out, and one indeed in which there are many factors to be considered. My own investigations so far may very probably have only touched a few of the most important of them. I am glad, however, for the opportunity of submitting these observations to the farmers of Missouri, in the hope that it may arouse a greater interest and more careful thought on their part, and thus develop on their own farms and under their own local conditions further solutions of the many problems in connection with this extremely important crop. I thank you for your kind attention.



Missouri Cattle Feeders' Association.

OFFICERS.

President—S. P. Houston, Malta Bend.
Vice-President—S. W. McClure, Lamonte.
Second Vice-President—M. T. McGill, Perry.
Secretary-Treasurer—H. O. Allison, Columbia.

HISTORY OF CATTLE FEEDERS' ASSOCIATION.

(H. O. Allison, Assistant Professor of Animal Husbandry, Agricultural College, University of Missouri.)

H. O. Allison.

The Missouri Cattle Feeders' Association was organized in January, 1911, at a meeting of cattle feeders called by the College of Agriculture of the University of Missouri. The charter membership of the organization numbered fifty and represented twenty-seven counties in the State. It is expected that a large number of feeders representing the cattle feeding interests in all parts of the State will eventually become members.

A constitution and by-laws were adopted which provide for a president, two vice-presidents and a secretary-treasurer, to be elected each year at the annual meeting. These officers constitute an executive committee, which has control of all business of the Association, except when the Association is in session.

A membership fee of one dollar ($1.00) per year, payable at each annual meeting to the secretary-treasurer, was agreed upon for the purpose of covering the incidental expenses of the organization.

The purpose of the Association is to organize beef producers into a working body of men to represent this special phase of agricultural production. It is planned to hold at least one regular meeting each year, the program for which will be provided by the executive committee. Subjects of interest to cattle feeders will be discussed by the best authorities it is possible to obtain. Experiment Station work will be followed, particularly the cattle feeding tests conducted by the Experiment Station at the University of Missouri. Associated subjects, such as railroad transportation, markets and tariffs, will also be included; in fact, whatever is of common interest to the beef producers is within the scope of the Association.

Special meetings may be called by the president whenever the conditions seem to justify it. An effort will also be made throughout the year to encourage co-operation among members and to keep in touch with the cattle feeding situation within the State.

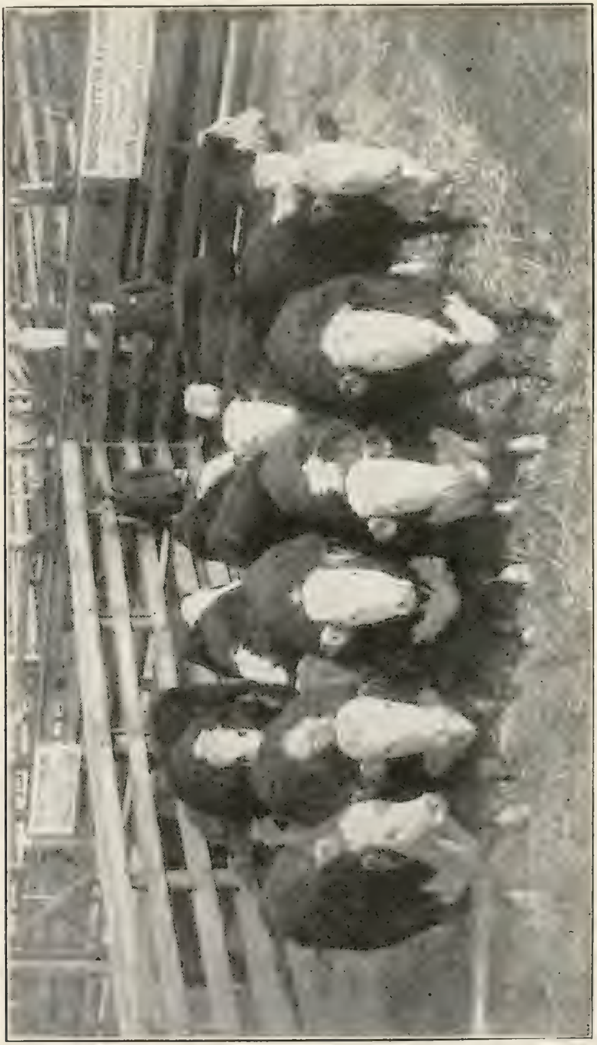
BUYING, FEEDING AND SELLING THE STEER FOR PROFIT.

(J. G. Imboden, Decatur, Illinois.)

J. G. Imboden.

It is certainly gratifying to me to see such an audience of men interested in the agricultural and live stock industries of a great State. No matter how rich our farms may be we cannot continually crop them without exhausting the fertility of the soil, and if we hope to maintain the fertility or add to it we must handle live stock in connection with agriculture; and while there may not always be a direct profit in dollars at the time, there is a profit that comes to us indirectly later in the maintained increased fertility of our land.

I am to have thirty minutes to consider the question of buying, feeding and selling the steer for profit—not a long time to buy, feed and sell a steer, but sometimes we feeders would be better off if we only owned a steer for thirty minutes, for unfortunately we own him too long in many cases. If I were to tell you that during the 25 years I have been feeding cattle I never bought a load of cattle too high, never fed any that did not make a satisfactory gain, and never marketed any on a mean market, you would know I was not telling the truth, or that I had handled very few cattle. My experience has been just the experience of every feeder here who has been long in the business and of every feeder who will remain long in the business. I have bought cattle too high; I have fed them where they did not make satisfactory gains, and I have marketed them on very mean markets. There is an element of chance in our feeding operations which we cannot escape, and if a man is not willing to take some risk he will never make a cattle feeder. And the question of feeding these cattle for profit is one that should greatly concern every man interested in the business. The older feeders, the men who have made much money in feeding cattle, are today practically out of the business, and the feeding operations on the farm are now conducted by their sons or tenants, but when the father or the landlord advises his son or tenants to feed cattle for profit he must remember that conditions have greatly changed since he made money in the business and the method that was practical and profitable years ago will not do today. When the average feeder, as is the fact today, must borrow money to buy his cattle and is struggling to pay for a farm and get out of debt, the question of profit is one that greatly interests him; and when I speak of profit I don't mean that profit that we sometimes think we get when we top the market with a load or two of cattle, but that profit in dollars and cents that we greatly need in business. There is no feeder who is quite smart enough to know when to feed cattle and when to stay



Texas yearling steers, bred by Boog Scott Bros., Coleman, Texas; fed by John G Imboden, Wayside Place, Decatur, Ill.; shown at Chicago International, 1906; awarded first in class, first in Hereford specials and first in return. Average weight of cattle, 1,174 pounds; sold at $8.90 per hundredweight, or $104.48 per head.

out and let the other fellow feed. I want to say to you that if you are so situated that you can handle one, two or three loads of cattle a year I would advise you to continue in the business year after year, and in the end I think you will have a reasonable profit on the business enterprise, and that is all we have a right to expect. There never was a time when business men were doing business on as small a margin as today. Large corporations are doing business on small margins. You say they are getting enormously rich—and that is true—but it is on the volume of business they do. Competition is close in nearly all lines and the per cent of profit is small, and for that reason I say feeders must expect in the future, as they have in the past, to do business on a small margin.

There are three interests that have a right to share a profit in this beef production; that is, the man who owns the cow that produces the calf, the man who carries the calf up to the time it is ready to go in the feed lot, and the feeder that finishes and markets this steer, whether it be three months, six months or a year. We all agree that each party has a right to share a profit if there is one, but we all know that conditions during the last few years have been such that feeders have had to pay very high prices for their feeding cattle, and while the prices paid have been satisfactory to the grower, they have often been too high for the feeder to handle at a profit. On the other hand, if the feeder buys his steers from the grower at a price worth the money and will make a satisfactory profit to the feeder, the grower has often produced the steers at a loss; so that if every interest realizes a profit we all see that the profit to each interest must be small indeed. You ask for the solution, and I would say this: That just so far as it is practical and profitable let every feeder be the breeder and grower of his cattle. There are a great many farms today that are almost barren of cattle, where there could be a few cows kept every year and calves produced at a profit. Kansas City is the greatest feeder cattle market in the world. But did you ever consider how far on an average these stock and feeding cattle were shipped from their breeding ground to reach the Kansas City market. I had in the feed lot last summer, and showed the cattle at the International at Chicago, a load of cattle bought in Nevada last January. They were six days getting to Denver and five days from Denver home—1,800 miles. A neighbor of mine had 100 cattle on feed, bred in Idaho, and the question of the future supply of feeding cattle, even if we are willing to go the distance, is one that must interest every feeder. There is no question in my mind but what in the next year or two there is going to be a noticeable shortage in cattle. About three months ago I spent a couple of weeks in Texas. From my observation and the information gained there, I learned that a great many of the small section men there—that is, men owning from three to five or ten sections of land—are entirely out of the cattle business, and the large ranchmen, with scarcely an exception, have reduced their breeding herds very materially in the last few years. The two weeks I was in Texas there were over 22,000 calves marketed on the Ft. Worth market, and if that doesn't mean a future shortage of cattle it seems very strange to me.

The question of buying these steers, is one that interests every feeder here. I am often asked what kind of cattle I like to handle, and I invariably tell the feeders I like the color of a good steer. I like to feed and handle good ones, but when I am buying cattle to put in the feed lot I will buy most any kind if the seller will take my price. If I go to a seller who has a bunch of cattle of choice breeding and quality that just suits me, the seller has much to do in naming the price. If, on the other hand, you go to a seller who has some cattle to sell that do not suit you, that do not suit the owner, and that do not suit any other fellow looking for cattle to put in the feed lot, you must remember then that the buyer has much to do in naming the price, and he can often buy at a price that will realize you a greater profit than if he had bought high class feeders at fancy prices. Now, don't understand me as advocating the breeding, growing and feeding of common and mean cattle. It cannot profitably be done. But I am speaking from the standpoint of a feeder and not from the standpoint of a breeder. Remember this one thing if you forget all else I say to you: If you are breeding your cattle or buying calves or yearlings, buy all the quality and breed all the quality you possibly can. If you must buy plain and common cattle, buy at a plain price, and buy cattle with age and turn on a short feed. I have bought cattle and put in the feed lot that cost me $5 a hundred. I have bought other cattle about the same weight at $3.50 a hundred and from that to $5 a hundred, and fed them together, and at market time there would be about 50 to 75 cents difference between them, going on the same market as finished beef. Remember, the quality of meat is something that is fed into the animal; that is the quality that is demanded by the consumer. The conformation and type and breed characteristics must be bred into the animal; that is the quality that is demanded by the consumer. But when we look at it from the standpoint of a feeder, he must remember that he must place his money in that steer which he thinks will realize him the greatest profit on the investment. The trouble the last few years has been that the margin has been too small between the cost of the feeder steer and the cost of the finished steer when it goes to market. And I don't see anything in the future that will justify the feeder in believing that the margin between the feeding steer and the finished steer is going to be any greater than in the past few years. The fact that these feeders are advancing every week is evidence that the feeders are going to pay extremely high prices in the next 30, 60 and 90 days.

The average feeder does not get to exceed five pounds of gain from a bushel of corn consumed by his cattle during the winter feeding period. Corn through Central Illinois is now worth 40 cents a bushel, and it is probably about that price here in Missouri. Forty-cent corn means $8.00 a hundred for the gain that the feeder is making on his cattle in the feed lot this winter, and the average feeder is not making it for any less than that. We must realize, then, that the gain that the steers make in the feed lot on corn is invariably made at a loss. It is rarely the case that we can sell a finished steer at a price that has made a profit on the gain that steer has made while in the feed lot on a full feed of corn.

The question is then asked, how can feeders make money feeding cattle. If they make any money at all it is the advance they get on the original weight over cost price. To illustrate: A feeder buys a 1,000-pound steer at $5 a hundred. It costs him $50. He feeds that steer 60 bushels of corn at 40 cents a bushel—$24. The steer has cost him $74. At the end of that feeding period he has a 1,300-pound steer. He sells at $6 a hundred—$78. He has made a profit of $4 on the feeding operation. The 300 pounds gain that cost $24 he sold for $18—a loss there of $6, but he had $1 a hundred advance on 1,000 pounds started with—$10, leaving a profit of $4 a head, and I will leave it to any feeder here if that is not a fair statement of conditions, and about all a feeder can hope to get under present conditions if feeders get $1 net advance over cost price for their fat steers. I think it is as much as they can reasonably expect on a feed period of from four to five months.

The question of feeding these cattle after once procuring them is one that interests every feeder here, and we must remember that as the age of the animal increases the cost of beef production increases, and as the feeding period expands the cost of gain increases. Now, that does not necessarily prove that there is more profit in feeding a calf or a yearling than in feeding older cattle, but every feeder knows that every additional hundred pounds put on cattle has cost more than the hundred pounds put on previously.

And the question of profitable feeding is one that interests us all. I am not going to talk to you about protein and carbohydrates and a balanced ration, but I will talk to you about corn, clover, hay, alfalfa, and such products as the farm will produce. I believe in making the most possible out of what the farm produces or can be made to produce. We are extravagant feeders of corn and probably always will be throughout the corn belt. Corn is our greatest feed for beef production and always will be. And yet I think we are extravagant in the use of corn. I think we feed too much corn alone, to the exclusion of other products that might be fed profitably with the corn. I think shock corn is one of the best single feeds that can be given a steer, and it is the best single feed that can be fed throughout the feeding period. As a rule, I would say, it does not pay to grind corn for cattle, and yet I grind nearly 75 per cent of all the corn I feed, and for this reason: I have only a small farm—100 acres—mostly in grass, and I buy practically all my feed. I grow a few acres of corn and put it in the shock. I find that by grinding corn, cob and all, and compelling the cattle to consume the cob with the corn, I save a great amount of roughness. Cattle will do very well on corn and cobmeal alone without other roughness, and I think for the first 30 to 60 days 100 pounds of corn and cobmeal is worth as much as 100 pounds of shelled corn. A little later the cob can be eliminated with profit. I have used a self-feeder for a number of years with very satisfactory results.

On account of economy of labor I think the self-feeder can be used with profit. I would prefer, if it could be done, to feed cattle just what they would clean up regularly, but on account of saving of time and labor I largely use the self-feeder and my cattle have done very well. I am feeding in connection with corn and cob meal either cotton seed meal or linseed meal. The cotton seed meal is stronger but not so safe as the other, especially with young cattle. Older cattle, that we expect to market in three to five months, we prefer to feed cotton seed meal, feeding from 3 to 5 pounds a day to the steer. I have soaked corn for cattle and I have cooked corn for them, and I believe to soak the corn has increased the value of it ten per cent. The cooking was not very satisfactory. I want to say here to feeders, that if your system of handling and feeding cattle has been profitable to you, if you have been getting satisfactory results for the amount of labor involved, money invested and feed consumed, I would not advise you to change your feeding operations on account of anything I may say; but if results have not been satisfactory to you, I think a gathering together of feeders like this can be of mutual benefit by exchanging ideas, one with the other.

The question of marketing these cattle after once finished is a very important one. I think that when a feeder puts his cattle in the feed lot he should, considering the quality, age and flesh of his cattle, the available feed and his bank account, decide then when those cattle should be marketed, and feed accordingly, and market at the time decided upon. This thing of holding fat cattle waiting for a good market is very unprofitable and unsatisfactory. I invariably, when starting a bunch of cattle on feed, decide within a week or ten days when I will market them, feed accordingly, and market them regardless of conditions. I do not mean that I would go on a demoralized market or if a strike was on, but I believe in marketing cattle when they are ready to go to market. There are too many feeders who finish their cattle and then write to commission men and tell them they have some cattle ready for market and would like to be advised as to when to have them there. They read the daily market, get daily reports from commission men, and when market conditions suit or they get tired of holding, they ship their cattle and find there are many other feeders there with cattle and the market is a disappointing one. We must remember that the good markets are shared by few and the mean market by many, and that is what makes the mean market—too many get there at the same time. I will venture the assertion here that if you will pick a dozen feeders from this audience and let half of them feed cattle for the next five years and name their shipping date ahead, whether three, six or eight months, and ship their cattle at that time, they will strike as good average markets as will the other six feeders who will first finish their cattle and wait for the market to suit them.

In regard to pork production in connection with steer feeding, I want to say that the gain that hogs make on the corn actually consumed by the cattle is greatly overestimated. You hear a feeder say, "Well, my cattle did not do very well, but I sold $1,000 worth of hogs and had $200 left." He leaves the impression that there has been $1,200 worth of pork produced from the corn consumed by the cattle, when the fact of the matter is the hogs were worth about $800 when they went into the feed lot, and the gain the hogs made from corn actually consumed by the cattle was very small compared with what they claimed it was. We cannot profitably feed cattle without taking the hog into consideration, and feeders ought to remember that when they are putting corn into that form, so that the cattle will get the most possible out of it, there is not quite so much left for the hogs, and I say that ear corn, where hogs can follow the cattle, will give as satisfactory results one year with another, taking into consideration beef and pork production, as most any form in which you can feed the corn. Clover hay or alfalfa hay in connection with corn is one of the best balanced rations that the farmer can produce on the farm; and if the feeder has clover or alfalfa for roughness, with corn at 40 cents per bushel, I do not think he can afford to buy linseed meal at $30 to $35 per ton or cotton seed meal at $25 to $30, to feed his steers.

I have now hurriedly considered this subject, and if I can answer any question pertaining to it I will gladly do so.

DISCUSSION.

Q. What do you think about millet hay in connection with corn?

A. It is a very poor feed for the production of beef, and I would advise feeding some concentrate in connection with millet.

Q. Have you tried molasses with alfalfa hay?

A. I have never fed any molasses. We have fed some sugar in connection with corn to finish cattle.

There is one thing I think feeders will have to take into consideration in the next few years, and that is ensilage in connection with economical beef production. Our gains are costing us too much, and unless we can cheapen our gain by some mode of feeding, the question of profit in the future is one that will greatly concern us, and while I have had no experience with the silo I have talked with members of the Indiana Cattle Feeders' Association and they say that where ensilage has been used in connection with corn for beef production it has given very satisfactory results and has cheapened cost of gain. I believe the silo will come into quite general use among feeders. The manufacturers of silos are putting out a good deal of literature, and, of course, you must make allowance for the claims they are making in their circulars, yet there is a good deal of truth in the assertions they are making. One word with regard to patent stock foods now on the market—they have some merit but are not worth the money they cost you. If you want to invest your money in some kind of feed, buy flax seed or cotton seed products.

Q. What is your plan for salting cattle?

A. I have salt at all times before my cattle.

Q. How do you like snapped corn?

A. It is the best thing to start a bunch of cattle on. For the first 30 days there is nothing better. At the beginning of our feeding period we want to get as much roughness in our cattle as possible, and there is nothing better for that period than snapped corn. It is a good feed throughout the feeding period if the feeder is short of roughness.

Q. How is prairie hay in connection with ear corn?

A. Not very good, and there should be some concentrated food fed in connection with prairie hay and ear corn.

Q. Do you advise breaking corn or feeding it whole?

A. Breaking it, as a rule. It depends on how many hogs follow the cattle and how much corn you have got to waste. I know feeders who feed whole corn entirely, but most feeders break the corn and think it the best plan.

Q. How much clover hay do you feed?

A. I think they should be fed all they will clean up. I don't believe in feeding hay or any kind of feed extravagantly, but I think they can profitably be fed regularly all the clover hay they will clean up without waste.

Q. After you start to feeding cattle, how soon do you get them on full feed?

A. That depends on the length of the feeding period. If I wanted to get cattle off in a short feeding period I would get them on full feed in a week or ten days. If I wanted to carry them longer I would take more time in getting them on full feed.

Q. Do you feed on dirt floors?

A. I have a barn open on the south, and I feed everything in the barn and sheds adjoining. They go in and out when they please. I don't believe in close confinement of cattle, yet I don't believe in feeding them in the open. I like to have feed troughs under cover and feed everything under cover. There are many good timber feed lots, and I know of some that are better than the average shed or barn and mud lot.

Q. Do you advise feeding once or twice a day?

A. I would advise feeding twice a day, but many feeders feed only once a day, with satisfactory results.

Q. In case the water freezes in a tank, would it pay to put a heater in that tank.

A. I believe in keeping the ice off the water, but I don't aim to keep the temperature of the water much above freezing point. When the water freezes over night we make a fire and thaw it out in the morning.

Q. What age cattle is most profitable to feed?

A. Gain can be made on calves cheaper than on yearlings, and on yearlings cheaper than on two-year-olds, and on two-year-olds cheaper than on three-year-olds, but that does not necessarily prove that there is more profit in feeding calves. While the calf will make more pounds from a bushel of corn, the average weight of the calf—say 400 pounds—is so small that the advance over cost price will leave you a very small margin; while if you had a 1,000 or 1,200-pound steer and get an advance of $1.00 a hundred on a three to five months' feeding period you would have $10 or $12, and you can finish an aged steer in three or five months when you might have to feed a calf for six, eight or ten months. I have fed calves for 10 months with satisfactory profit, but I don't want to put a long feed period on an aged steer—not over five months. I think, as a rule, there is greater profit in a shorter feed period. The prime heavy cattle today are not bringing enough money, and it is not always the cattle that are selling for the most money on our markets that are making the feeder the most money. The demand now is for the medium fat cattle, and the reason for that is that we have had too many prime heavy cattle.

Q. What is the objection to feeding cotton seed meal to young stock?

A. I have fed cotton seed meal to calves and yearlings, but there seems to be an irritant about it. The calves have not done as well as with the linseed meal, and the hogs following the cattle have invariably done better with the latter.

FATTENING CATTLE ON BLUE GRASS PASTURE.

(F. B. Mumford, Dean of College of Agriculture and Director of Experiment Station, University of Missouri.)

The Missouri Experiment Station has been investigating for several years the fattening of cattle on blue grass pasture.

The following extracts are taken from Bulletin 95 of the Station, which contains a complete record of these investigations.

VALUE OF LINSEED OIL MEAL.

All the results of these investigations show that the feeding of a nitrogenous supplement like cottonseed or linseed meal during the later stages of the feeding period is a profitable practice. This is clearly shown in the records of lot 70, which received linseed oil meal during the last eight weeks of the fattening period. (See table 1.)

TABLE 1.

VALUE OF LINSEED OIL MEAL DURING THE LAST PART OF THE FEEDING PERIOD—AVERAGE DAILY GAIN, YEAR 1906.

	Lot 71. Corn.	Lot 70. Corn five months and corn and linseed meal two months.	Lot 73. Corn and linseed meal.	Lot 72. Corn and cottonseed meal.
	Lbs.	Lbs.	Lbs.	Lbs.
First five months	1.93	2.01	2.23	2.17
Last two months	1.69	2.48	2.12	1.93

Not only were the average daily gains in Lot 70 receiving shelled corn materially increased by the addition of linseed oil meal, but the Lot (70), receiving this addition during the last two months of the feeding period, made a larger gain than was made by any other ration in the experiment during the same time. These results also show what has been mentioned in the preceding discussion, page 301, that the supplemented rations maintained average daily gains during the closing weeks of the fattening period much more successfully than corn alone. (Compare lots 71, 72 and 73.)

Lot 70 was the only lot in five years' investigations with four hundred cattle that made a larger gain during the last two months of the feeding period than during the earlier months. This important result is to be particularly noted, as it tends to emphasize in a marked degree the effect of adding the nitrogenous supplements to an exclusive corn ration during the closing weeks of the fattening period. It also indirectly tends to confirm what has already been said that the nitrogenous supplements will invariably produce higher gains than corn alone in animals already in high condition. It is probably true that the reason for the marked efficiency of the linseed meal during the later stages of the fattening process is due to the greater palatability of the ration, which induces the animal to consume considerably larger quantities of the rations offered. It is manifestly increasingly important to consider the effect of palatability during the later stages of the fattening process than during the beginning, when the animals are in thin condition.

The conclusion seems clear from the results of these investigations that it will be highly profitable to feed a limited amount of nitrogenous supplements during the later stages of the feeding period to cattle that have received an exclusive grain ration of corn.

INFLUENCE OF CONDITION ON COST OF GAIN.

If the results for the years 1903, 1904, 1905 and 1906 are considered by themselves it will be seen that in those years there was practically no difference in the amounts of grain required for one pound of gain between the lots of cattle receiving the different rations. The results for the year 1907 indicate that the supplemented rations require considerably less grain for one pound gain than the ration of corn alone. The table (2) following is arranged to show the average amount of grain required to make one pound of gain for the four years, 1903, 1904, 1905 and 1906, as compared with the year 1907.

TABLE 2.

INFLUENCE OF CONDITION—AVERAGE GRAIN REQUIRED FOR ONE POUND OF GAIN.

	Corn.	Corn and linseed oil meal.	Corn and cottonseed meal.	Corn and gluten feed.
Average for four years (1903, '04, '05 and '06.)	7.37 lbs.	7.31 lbs.	7.39 lbs.	7.64 lbs.
Average of 1907	9.48 lbs.	8.83 lbs.	8.89 lbs.	....

It will be seen from this table that in 1907 the corn ration required more grain for each pound of gain than did the supplemented rations. The explanation of this variation in the results for the years mentioned is that the yearlings fed in 1907 had already been on full feed six months when they were turned to grass on the first day of May. They were therefore in much higher condition throughout the summer feeding period than were the cattle of any other previous year. It has already been shown that the supplemented rations are more efficient during the later stages of the feeding period. The conclusion seems to be justified, therefore, that with thin yearling cattle, full fed on blue grass pasture for a period of six or seven months, corn is as efficient from the standpoint of the amount of grain required to make one pound of gain as are the supplemented rations. Cattle already half fat make more economical gains on corn supplemented with linseed oil meal or cottonseed meal than on corn alone.

In practice, corn alone fed to yearlings on blue grass pasture will prove as efficient as corn supplemented by linseed oil meal, cottonseed meal or gluten feed for the production of cattle that would grade on the market as good to choice. For the production of prime cattle it would appear from these results that the addition of linseed oil meal to the ration either for the entire period or for the last three months of the fattening period will be a profitable practice.

THE EFFICIENCY OF RATIONS AT DIFFERENT STAGES OF THE FATTENING PERIOD.

The amount of grain required to make a pound of gain varies considerably at different stages of the fattening period. This is particularly true in the summer feeding experiments. It will be observed from an examination of Table 3 that in general the amount of grain required to make a pound of gain is least in May, June and July. The average amount of grain of all rations required to make a pound of gain through the first three months of the fattening period was 5.74 pounds. The average amount of grain for the last four months of the feeding period was 10.15 pounds. In other words, it required 77 per cent more grain to make a pound of gain during the last four months than it did during the first three months. The explanation of this marked difference in the economy of gains at different stages in the fattening period is undoubtedly in most part due to the fact that thin animals make more economical gains than do those in half fat or fat condition. In all of the investigations so far reported, and in the investigations of this Station where animals have been full fed, the cheapest gains are made at the beginning of the fattening period.

TABLE 3.

AVERAGE OF ALL YEARS.

Period.	Month.	Corn alone.	Corn and linseed oil meal.	Corn and cotton-seed meal.	Corn and gluten feed.	Corn alone 5 mo. Linseed oil meal 2 mo.
I	May	4.48	5.01	5.03	3.45	3.02
II	June	6.42	6.31	6.48	5.58	4.84
III	July	7.48	7.56	6.85	8.10	5.43
IV	August	10.85	9.82	10.03	8.94	8.83
V	September	8.91	9.75	8.59	9.11	8.79
VI	October	8.87	10.04	9.68	10.25	7.63
VII	November	18.81	11.31	11.67	11.37	9.72

The fat animal, although consuming relatively as large an amount of grain, does not make as good use of the food consumed. The influence of condition upon economy of gains is one of the most important factors in connection with profitable beef production. It is generally true that the cost of gains increases rapidly with the improvement in the condition of the animal.

In this comparison of the effect of different rations upon the amount of grain required to make a pound of gain we are not able to draw any very definite conclusions, upon the comparative value of the various combinations of feed during different stages of the fattening period. There seems to be no particular advantage of one ration over another. Exception to this is to be noted in Lot 70. In this lot cattle received corn alone for five months, and corn and linseed oil meal in the proportion of six parts of corn to one of linseed oil meal during the last two months of the fattening period. The gains made by this lot were consistent throughout and showed less marked variation in the requirement of grain during the later stages of the fattening period. The average amount of grain required to make a pound of gain during the first three months in Lot 70 was 4.43 pounds. The average amount of grain required during the last four months of the fattening period was 8.76 pounds. Comparing these figures with those given on page 302, it will be seen immediately that this particular method of feeding was the most efficient of any ration or method of feeding used in this experiment. Probably the amount of grain required to make one pound of gain increases somewhat more rapidly during the later stages of the feeding period when corn alone is fed than when supplemented rations are employed.

TABLE 4.

FATTENING YEARLING CATTLE ON BLUE GRASS PASTURE—INCREASED AMOUNT OF GRAIN REQUIRED FOR ONE POUND OF GAIN DURING LATER STAGES OF FATTENING PERIOD.

Average of Sixteen Experiments with 126 Animals.

Period.	Corn alone.	Corn and linseed meal.	Corn and cottonseed meal.	Corn and gluten feed.	Corn alone 5 mos. and corn and linseed meal 2 mos.
	4 Exps. 31 steers.	5 Exps. 42 steers.	4 Exps. 32 steers.	2 Exps. 14 steers.	1 Exps. 7 steers.
First 3 mos.	6.26 lbs.	6.35 lbs.	6.12 lbs.	5.71 lbs.	5.06 lbs.
Last 4 mos.	11.95 lbs.	10.11 lbs.	9.99 lbs.	9.92 lbs.	8.76 lbs.
Increased per cent of grain required during last 4 months.	.91%	.59%	.63%	.74%	.73%

AGE AS A FACTOR IN BEEF PRODUCTION.

Other things being equal, the younger the animal the larger will be the gains in live weight from a given amount of food. No principle in connection with the feeding of meat animals has been more firmly established than this. If other factors remained always the same then the number of pounds of grain required to make a pound of gain would be an accurate measure of the efficiency of different animals for meat production. Measured by this standard alone, young animals would invariably be more profitable to feed.

But in practice other factors may conspire to overcome the higher efficiency of young animals in the production of animal tissue.

One factor which may exert a more powerful influence over the gains made than age is the condition of the animal at the beginning of the feeding period. As has already been shown in this bulletin, a two or three-year-old animal in thin condition may make gains in live weight from the same or a smaller amount of grain than a yearling. It is easy to understand from the facts set forth in this bulletin that a young animal in fat or half fat condition at the beginning of the feeding period may require more grain to make one pound of gain than will a two or three-year-old animal in thin condition.

Another factor which determines to a certain extent the age of cattle most profitable to feed is to be found in the requirements of the fat cattle markets for a certain amount of fatness in the animals shipped to market by the producers. The fatter the animal, within certain limits, the higher the price paid by the buyer. Here, again, it is unquestionably true that the older and more mature animals will reach the desired degree of fatness in a much shorter time than will young animals. In every comparison in this bulletin between young and older cattle, the older cattle have reached a certain stage or degree of fatness in a much shorter time than have the younger animals. It has been shown also that the longer the animals are fed the more grain is required to make one pound of gain. It might, therefore, easily follow, that in order to finish young animals to the same degree of fatness as more mature cattle that they would have to be fed for so much longer periods that the average amount of grain required to make a pound of gain in young cattle would be as large as in the case of the more mature animals.

Perhaps no other factor bears a more important relation to the ultimate profits in beef production than does the margin between the buying and the selling price, and here, again, it is undoubtedly true that under existing conditions the margin is wider on mature thin cattle than upon more fleshy young animals. The thinner the animals the less competition exists between buyers of feeder cattle and the butchers. In the case of fat or half fat animals the feeder must compete with the killer, and, therefore, will always pay a relatively higher price for half fat than for thin animals.

We must conclude, therefore, that the amount of grain required to make a pound of gain is not an accurate measure of profitable cattle feeding. It is also reasonable to assume from the facts herein discussed that it may often happen that larger profits will result from the feeding of mature thin cattle than from feeding younger animals.

Table 5 records the average amount of grain, weights and gains made by all the cattle of all ages in our summer feeding experiments. This table is not to be regarded as a final answer to the question as to the relative efficiency of cattle of different ages because, as already explained, it is impossible to eliminate the other factors which have a marked influence upon the meat producing qualities of animals.

The table is interesting, however, and shows that yearlings require less grain to make a pound of gain than do older animals. They likewise require a smaller total amount of grain to make them fat. It must be said, however, that in all of these experiments the yearling cattle did not attain to the same degree of fatness as did the more mature animals.

TABLE 5.

MISSOURI CATTLE FEEDING EXPERIMENTS—INFLUENCE OF AGE—SUMMER FEEDING —AVERAGE OF ALL EXPERIMENTS.

Thirty-six Experiments with 262 Cattle.

	Yearlings.	Two-year-olds.	Three-year-olds.
Number of experiments	20	8	8
Number of animals used	156	55	51
Average number of days fed	194	210	179.12
Average grain fed to each lot	3203.8 lbs.	4307 lbs.	4104 lbs.
Average pounds grain fed per day and head	16.46 lbs.	20.509 lbs.	22.91 lbs.
Bushels of corn necessary to make each animal fat.			
Corn fed lots	54 bu.	74 bu.	71 bu.
Average daily gain	2.14 lbs.	2.61 lbs.	2.44 lbs.
Total gain necessary to make animals fat	416 lbs.	548 lbs.	438 lbs.
Weight of cattle at beginning of experiment	790 lbs.	908 lb .	1304 lbs.
Grain eaten daily per 1000 lbs. live weight	16.48 lbs.	17.35 lbs.	15.03 lbs.
Grain for one pound gain	7.69 lbs.	7.85 lbs.	9.36 lbs.
Average weight during experiment	999 lbs.	1182 lbs.	1524.8 lbs.

CONDITION AS A FACTOR IN BEEF PRODUCTION.

No one fact is more completely shown in the records of these experiments covering five years with many different rations, and with cattle of different ages, than that the condition of the animals at the beginning of the feeding period has a very important influence upon the final result. In every case where accurate comparisons could be made, the fatter the animal at the beginning of the feeding period the more grain was required to make a pound of gain. Not only was this true, but in every single experiment as an animal improved in condition the cost of the gains became greater. It seems reasonable to conclude from the results of these investigations that thin animals fed on a ration which will cause rapid gains will, other things being equal, be most profitable.

No very great and important differences have been discovered as between shelled corn and shelled corn supplemented with nitrogenous supplements when fed to cattle grazing on good blue grass pasture. This statement refers to the first three or four months of the feeding experiment only. It seems to be a general rule that in long feeding experiments supplemented rations maintain more uniform and consistent gains than does the ration of shelled corn.

SUMMARY AND CONCLUSIONS—FATTENING CATTLE ON BLUE GRASS PASTURE.

1. *Rate of gain.*—The average of five years' work shows that, in general, where nitrogenous supplements were fed to young cattle the rate of gain was greater than where corn alone constituted the sole grain ration.

2. *Palatability.*—One explanation of the larger gains is that in all cases the supplemented rations seemed to be more palatable and were eaten in larger quantities.

3. *Feeding supplements during later stages of feeding period.*—The conclusion seems clear from these investigations that it will be highly profitable to feed a limited amount of nitrogenous supplement during the later stages of the feeding period to cattle that have been receiving a grain ration of corn alone.

4. *Grain for one pound gain.*—There is little difference between the various rations fed in this experiment to yearling cattle *in respect to the number of pounds of grain required to make one pound of gain.* A ration exclusively of corn fed to yearling cattle on blue grass pasture was nearly or quite as efficient as were the supplemented rations.

5. *Influence of condition.*—When the animals are in a fat or half-

fat condition at the beginning of the feeding period, the grain required to make one pound of gain is increased. The thinner the cattle at the beginning of the feeding period, the less grain is required to make one pound of gain.

6. *Effect of rations on the finish of cattle.*—A better finish has in every case been secured from the feeding of supplemented rations than from feeding corn alone.

7. *Uniform gains.*—More uniform and consistent gains resulted from the feeding of supplemented rations.

8. *Supplemented rations better for half-fat cattle.*—The fatter the animal the more efficient relatively are the supplemented rations.

9. *Daily grain consumed.*—The cattle receiving supplemented rations ate more grain per head and per day than those receiving an exclusive corn ration. The amount of grain consumed increased gradually to the end of the fifth month. Towards the close of the feeding period there is a marked difference between the amounts of grain consumed by cattle receiving supplemented rations and those receiving corn alone. In every case the supplemented rations are consumed in considerably larger amounts during the closing weeks of the finishing period.

10. *Limited feeding.*—An exception to 9 is to be observed in the year 1906, when all lots were limited in the amounts of grain fed, and this year the cattle were not full fed during the first three months, and as a consequence the consumption of grain increased toward the end of the experiment.

11. *Supplemented rations fatten cattle more quickly.*—In these experiments a ration of corn supplemented with some nitrogenous material, such as linseed meal or cottonseed meal, fattened cattle more quickly than did a ration of corn alone when fed to cattle on blue grass pasture.

12. *Efficiency of rations at different stages of the feeding period.*—All rations are much more efficient during the first three months of the feeding period. It required nearly double the amount of grain for each pound of gain during the last four months, as compared with the first three months of the feeding period. This increased requirement was less in the case of Lot 70, receiving corn alone during the first five months and corn and linseed oil meal during the last two months of the feeding period.

13. *Cost of gains.*—Under conditions similar to those existing in this experiment the supplemented rations invariably cost more than the rations of corn alone. The relative cost for each hundred pounds of gain was less for the lots receiving shelled corn than for the lots receiving supplemented rations.

14. *Supplemented rations rapidly increase values.*—In general for short feeding periods the supplemented rations increase the value per hundred pounds more rapidly than does a ration of shelled corn.

15. *Adding supplements during later stages of feeding period.*—During the last sixty days the addition of linseed oil meal to a ration made up exclusively of corn resulted in a considerable increase in the rate of gain and a consequent decrease in the amount of grain required to make one pound of gain.

16. *Efficiency of corn alone.*—Measured by gain in live weight in this experiment feeding a ration made up exclusively of corn to two-year-old cattle on blue grass pasture was almost or quite as efficient for thin cattle on a short feed as was the feeding of supplemented rations. For longer feeding periods the supplemented rations are better. (Table 18.)

17. *When to feed supplements.*—The results of our experiments for many years with various rations and kinds of cattle clearly indicate the value of supplements in maintaining the appetite and in securing satisfactory gains during the last stages of the feeding period. The value of supplements during the first part of the feeding period has in many experiments been of doubtful economic value.

18. *Proportion of supplement to feed.*—In our experiments a grain ration composed of 6 or 7 parts of corn to one of linseed oil meal or cottonseed meal has been more efficient than rations containing a larger proportion of supplement.

YEARLING, TWO-YEAR-OLD AND THREE-YEAR-OLD CATTLE COMPARED.

1. *Average daily gains.*—Two-year-old cattle make larger average daily gains than yearlings.

2. *Grain eaten daily.*—Two-year-old cattle consume from 13 per cent to 22 per cent more grain per day and per head than do yearlings.

3. *Grain eaten per thousand pounds live weight.*—Two-year-old cattle in this experiment consumed more grain per day per thousand pounds live weight than yearlings.

4. *Grain required for one pound of gain.*—Yearlings requires less grain for each pound of gain than do two or three-year-old cattle. Other things being equal, the younger the animal the less grain is required to make a pound of gain. The condition of the animal at the beginning of the feeding period is an important factor, and may to a large extent counteract the influence of age in determining cheaper gains.

5. *Most profitable age to feed.*—In these investigations the fat-

tening of two and three-year-old cattle has been generally more profitable than fattening yearlings. The chief reasons are

a. The margin between the buying and selling price is less in the case of yearlings than in the case of two and three-year-old cattle.

b. The older cattle fatten in a shorter period.

c. It is not generally advisable to try to finish the cheaper grades of yearlings. In our investigations the quality of the yearlings has been generally higher than of the older cattle. In spite of this fact the financial results have seemed to favor the feeding of the older cattle.

Missouri Draft Horse Breeders' Association.

OFFICERS.

President—J. F. Roelofson, Maryville.
Vice-President—Chas. Holland, Springfield.
Secretary-Treasurer—E. A. Trowbridge, Columbia.

HISTORY OF HORSE BREEDERS' ASSOCIATION.

(E. A. Trowbridge, Assistant Professor of Animal Husbandry, Agricultural College, University of Missouri.)

The Missouri Draft Horse Breeders' Association was organized during Farmers' Week at Columbia, Mo., December 29, 1909. It held its second annual meeting during Farmers' Week, January 10, 1911. Following is the program of that meeting:

Address of Welcome	Dean F. B. Mumford, Columbia
Missouri Draft Horse Breeders' Association	Pres. J. F. Roelofson, Maryville
Draft Horse Sales	Col. R. L. Harriman, Bunceton
Opportunities of Draft Horses in Missouri	Chas. Holland, Springfield
Draft Horses on the Medium Sized Farm	E. A. Trimmer, Kirksville
Value of Draft Horses to the Mule Business	L. M. Monsees, Smithton

It has been impossible to secure some of the addresses delivered at that time.

The Missouri Draft Horse Breeders' Association, during its short life of a little over a year, has directed considerable attention toward the draft horse interests of the State, and it has been of considerable influence in securing larger premiums for draft horses at the Missouri State Fair. It has thoroughly discussed and called attention to the stallion laws now in force in other states.

It is in a thriving condition at present, and it is sincerely hoped that it may be of even more benefit in the future than it has in the past. There is much work for it to do which it may do, and we trust that it will continue to grow and be of value to the State.

MISSOURI DRAFT HORSE BREEDERS' ASSOCIATION.

(J. F. Roelofson, Maryville, Missouri.)

J. F. Roelofson.

I have been placed on the program of the evening for a talk on the Draft Horse Breeders' Association. Some of you may want to know, and you may ask this question, what is the Missouri Draft Horse Breeders' Association, and what is it for? I should say that largely the benefits and possibilities of such an association are stated in its objects as follows:

1st—It will put the draft horse business in a more prominent position by increasing interest in it.

2nd—It will greatly facilitate buying and selling by helping breeders to keep in closer touch with each other.

3rd—It will greatly aid the cause of the draft horse at the Missouri State Fair, and may be the means of securing classes for Missouri bred draft horses at that show.

4th—It will help to educate the farmers of Missouri to the value of the draft horse, thereby increasing the volume of business.

5th—It will put the draft horse breeders on a foundation similar to that of the saddle horse breeders who are now well organized.

Lastly, it will be a potent factor in legislation which will ultimately be aimed at the undoing of the poorer class of stallions now in service in this State. It is a notable and serious fact that many horses which do not fill the requirements of the law in other states have been sold into Missouri, where the horse breeders are, as yet, unprotected by law. These alone, with many other benefits, may be derived from such an organization, and as is always the case, organized effort is greater in any direction than individual effort.

A little more than a year ago men interested in the breeding of draft horses in this State were asked to meet here in Columbia during Farmers' Week for the purpose of organizing themselves into this Missouri Draft Horse Breeders' Association. To that call a goodly number responded, and the result was that such an organization was effected, by-laws adopted and officers elected, which was about all that was done at that time, when we adjourned to meet at Sedalia during State Fair week.

At this meeting we had some splendid and enthusiastic talks by a number present, and on motion it was ordered that the chair appoint three members to act with the President and Secretary, as a committee to draft some form of stallion laws to be presented to the State Legislature at some future time. Now this, in brief, is what has been done up to this time.

Now, gentlemen, as to its purpose: It is and will be just what we make it. A united body of men, such as are directly and indirectly interested in the draft horse business in this great Missouri commonwealth, are capable of doing things that will increase the interest and the demand for the drafter in this State of ours. We can, no doubt, in this way secure stallion laws that will deliver us, as a State, from being a dumping ground for culls and horses of inferior quality, as well as blood lines, by some unscrupulous dealers of other states that have such strenuous laws as to prohibit their sale or public service in their own state. We can become better acquainted with each other, and by such acquaintance we will be of great mutual benefit to one and another in a common, and I might say a very worthy calling, for I think we might well be proud to call ourselves ''Missouri Draft Horse Breeders.''

We can have breeders' sales, wherein the small breeder can have an outlet for his stock and realize fully on the merits of the animal. In sales of this kind the man who breeds but few is on a par, so far as number is concerned, with the man who breeds them in greater numbers.

There are a great many things we can accomplish if we will. It is clearly up to us. Will we stand together and do what is best for us? As a matter of fact what is best for us along this line is best for the State at large. I do not want to be deemed guilty of ''blowing my own horn,'' but want to impress this upon you, gentlemen, that the man who breeds pure bred draft horses is and should be considered a public benefactor, and this should especially apply to Missouri. Breeders of cattle, hogs, sheep, and even poultry, organize, and for the most part are successful. Why should we not organize? I consider the horse the noblest of all living creatures except the human race itself.

Missouri is conceded to be a great State and the draft horse is a very profitable product to raise, and can and in fact is to a limited extent being grown in Missouri as good as anywhere. Why not increase the interest and demand for them here. Every farmer in Missouri needs and should have one or more teams of draft mares. No investment would bring better returns. They need them to do their farm work, handle their improved machinery, so necessary now for the modern, up-to-date farmer, as well as raise the big husky foals that they are so proud to own, and which their less fortunate neighbor almost covets, and which are always in demand at more than remunerative prices. These youngsters take very kindly to the luscious grasses, and no state or country raises better grasses and grains for their development than Missouri.

I notice in some of the papers that the Agricultural Colleges are very strongly urging the raising of better draft horses and are insisting that the farmers secure better mares for that purpose. Now we should not wait for any other state to set us an example along these lines, but forge to the front rank as breeders and produce the best possible.

It is a conceded fact that as good draft horses can be grown in America as in France, England, Scotland, Belgium or any other country. This has been clearly demonstrated by the winnings, American bred animals winning many of the best prizes in the open classes at the big horse shows of this country. I verily believe that, with the proper blood lines and the attention they so well merit, during their development, that no state or country can produce better draft horses than "Our Own Poor Old Missouri."

THE DRAFT HORSE ON THE MEDIUM SIZED FARM.

(Earl A. Trimmer, Kirksville, Mo.)

Earl A. Trimmer.

The medium sized farm is, as a rule, managed by a man of moderate means, one who must make the farm pay its way and produce a living, making profit when he can.

The modern farmer is getting right after that profit. He is broad gauged. He does not hesitate to double his investment in machinery and running stock whenever he sees an opportunity to increase his profit more, in proportion to the investment. One of the surest ways of increasing profit is to decrease expenses. One of the best ways to decrease expenses is to increase the efficiency by the use of larger machinery and more horse power.

Increase your horse power with size rather than numbers. The draft horse handles the gang plow, the four section harrow, the two row cultivator with so much greater ease than the lighter horse that a trial with him puts you to looking for a market for the lighter horse. And with the lighter horse, that is not strictly a high class harness or saddle horse, you generally *look* for a market, while with the draft horse the market hunts the horse.

There is no work on a farm too light for the draft horse where a horse is needed at all. Since we work the farm for every possible means of profit, it is not good business sense to keep, as working stock, only good draft mares that can work every day in the year except the ten days immediately following foaling. At the same time this mare will produce a colt that at weaning time is worth as much as the average price per head of all the horses in the State at the present time, and a colt which will increase steadily in value up to maturity, provided you do not knock him in the head with a stalk field the first winter.

I am informed that the horses imported into this country from France are raised by men on small farms, and that the price of feed is much higher there than here. Mr. John Huston, the venerable live stock judge and early importer, told us at our former meeting that he had paid 60 cents per day for pasturing colts in France. Should we not produce horses of equal quality on our cheaper and better pastures?

Environment means much in the rearing of the draft horse. Proper environment includes feed, care and shelter. We have the feed and the shelter on Missouri farms. Add the care and increase the profit. Feed the colt liberally the first and second winters and you have added many dollars to the selling price, for it is this feed and care that makes weight. Extra weight is worth $20 to $25 per 100 pounds in the market. Begin the first winter's feed when the colt is about a month old.

If your mares are what might be termed "near draft mares," that is, heavy farm chunks, and you are breeding up to heavy draft, you will find the good care of the colt often getting him into the draft class where otherwise he would be classed as a chunk, for the tendency of heredity is always downward. Therefore, the money difference in this case is at least $40.

I have mentioned the care of the colt. The mare should also have proper feed and care during pregnancy and you will have a better colt to begin with. Do not misconstrue the meaning of proper feed and care. Do not feed the mare as if you would capture the prize at the fat stock show, and do not give her such excellent care as a tight box stall and no exercise. Work her moderately, but avoid backing her or turning her short, or forcing her over slippery places, and avoid sudden changes of feed or work.

The cry throughout this entire land is *Draft Horse.* You may see it in every daily paper, every market report and in every farm journal under the heading, "Horse Market: Draft Horses, good to choice, first —Draft Horses, fair to good, second." Then the other classes follow. The draft horse will always hold the same place in the market. He is king.

I wish to say to the farmer who remembers so well the depression of

15 years ago, and who has worked only mongrels since, that it takes no more corn nor hogs to buy a good mare now than it did then, and at present there are 50 per cent more horses in the United States than there were at that time. They have a total value five times as great, while the demand becomes greater each succeeding spring, but it is the draft horse that is most in demand.

The importers and breeders of our country are devoting their time and investing their capital toward furthering the draft horse industry. They are placing good stallions in every farming vicinity. We farmers should show our appreciation by patronizing these stallions with worthy mares.

We do not appeal to the farmer to plunge into the horse business, but we do appeal to him to use only good draft mares as his working stock, raise only draft mares. Since he depends upon the World's markets as his outlet, he can only afford to produce that which the World demands.

PROFITABLE METHODS OF HORSE BREEDING FOR MISSOURI.

(E. A. Trowbridge, Columbia, Mo.)

Professor Trowbridge.

Missouri as a State has built up a great reputation for the production of high class harness horses, saddle horses and mules. This reputation annually brings to Missouri many of the largest buyers of this class of animals in America. There are many sections in the State which are at present producing excellent draft horses, and the interest in this business and the quality of horses are both increasing. Thus it will be seen that from within the borders of the State we are able to supply nearly every class of horse which the market demands. Horses and mules bred within the borders of this State, if of the proper type and quality, command most remunerative prices on the markets of our country. It is, then, very evident that the farmers of this State cannot afford to cease to pay attention to the breeding of high class horses.

There are several conditions which have made possible the existence and popularity of all classes of good horses in this State. Missouri is centrally located, between the north and south, the east and the west. Thus we have, on the various borders of the State, northern, southern, eastern and western agricultural methods and practices.

The various parts of the State differ considerably in soil, climate and topography. Thus various classes of horses and mules are adapted to various parts of the State. Some parts of the State are settled by people of southern origin, while other sections are settled by natives of the eastern, northern and corn belt states. Thus it may be seen that a variety of influences have been at work in Missouri, developing different classes of horses in accordance with personal likes and dislikes, and in accordance with the section of country in which they are located.

The early settlers of Missouri made their homes along the lines of transportation, namely, the navigable rivers, for there were very few railroads in Missouri at that early date. These early settlers came mostly from Kentucky, Tennessee, Virginia and other southern states. Later many settlers came into Missouri from Illinois, Iowa, Indiana and other states. The people from the various sections of country brought with them a type and kind of horse which most efficiently served in their native homes. In the case of the settlers from the south, it was the lighter type of horse, the saddle horse and the harness horse and the mule. The settlers from the east brought with them the larger type of horse, which has since been developed into our modern drafter.

Thus at an early date there could have been found within the State of Missouri horses of many different classes. At the present time, it will be noticed that in some sections of the State the harness and saddle horses predominate, while in other sections the draft horse, but almost without exception the Missouri mule is State-wide in his popularity. There is, then, the possibility and foundation upon which the State may develop into the greatest breeding State in the Union, producing high class animals of each of the various classes, but the very fact that such possibility exists and such foundation stock may be found makes possible much mixing of types and breeds which is retrogression. It is within the hands of the horse breeders of this State to handle this situation profitably or with poor judgment.

It is, in the opinion of the writer, practically certain that the demand for good horses and mules of any class will continue indefinitely. These horses and mules must be produced on the farms. Whether they are to be produced on a few farms or on many farms, remains to be seen. The greatest horse breeding countries of Europe are those in which a few good individuals are produced each year, on every farm, rather than where the business is concentrated into large breeding establishments. The production of horses in this manner results in a goodly profit without the investment of great capital, hence it is adaptable to almost every farm.

If we are to make the most of our opportunities, there are a few points which we may well consider. The first great factor which will help us to build up or tear down our horse breeding industry is cross-breeding. To produce horses that will sell for high prices it is extremely essential that we do not mix the breeds. The practice of breeding trotting and saddle horses to draft mares should cease, and vice versa. In mating mares great care should be taken to mate them to stallions of their own breed. This method of cross-breeding alone has cost Missouri a great deal of money in the past years. Many of our breeders have discovered this fact and have discontinued the practice, and it is to be hoped that many more will see the greater profits in the other method in the near future.

The other factor which will have much to do with our standing as a horse producing State in the future is the use of high class sires. This practice is growing each year, but there are used far too many inferior and unsound stallions in this State for its best welfare. Past experiences have proven that five to fifteen dollars difference in the stallion fee has resulted in an increased profit of from $50 to $100. To prove this to one's own satisfaction it is only necessary to observe the results of breeding operations of others, to compare the horses produced and the prices received by men who use only the very best sires obtainable with those who use only the very cheapest sires available.

There are these two factors which we must bear in mind if we expect to fill the position in the horse breeding world which another has made it possible for us to fill, namely, the cessation of the practice of cross-breeding, and second, the use of the high class sire.

Missouri Women Farmers' Club.

OFFICERS.

President—Miss Frances Pearle Mitchell, Columbia.

Secretary-Treasurer—Miss Alice E. Kinney, New Franklin.

Members Executive Board—Mrs. R. B. D. Simonson, Jefferson City; Mrs. Cora F. Shewell, St. Louis; Mrs. C. A. Cook, Centerview.

THE WOMEN FARMERS' CLUB.

(Miss Frances Pearle Mitchell, President.)

"Back to the farm" has ceased to be an idle phrase coined by wit or wag. It is taken seriously by young men and maids of this twentieth century of fads and fancies.

Who shall say it is not the call of nature to the innate primeval man in whom centuries of separation, civilization and luxury have failed to deaden the love of free life and fresh air!

For long it was that woman held to her ideas of self-effacement, of being a satellite to the male constellations of her family, but there came a time when she realized she had a brain and talents.

In this day of progress she uses all her forces, and you find her in every vocation. The last one which she entered was agriculture, for she had thought brawn and muscle alone requirements to success in that field.

Now she is "Lady of the manor"—she directs, superintends, buys and sells. She discusses the good points of her cattle and hogs, as she, in the 16th century, talked of her pet poodle and canary bird. Instead of the flower garden of Colonial days, she bends her energies on great fields of waving grain—not that she neglects the flowers, but she extends her interests to include both.

Missouri women have not been behind in adopting this profession, but through modesty or indifference, they have been hiding their light under a bushel. They were content to pursue the tenor of their way, "To fortune and to fame unknown."

When the annual Farmers' Convention met a few were there to hear the lectures on corn raising and farm management, to contrast it with their own methods, often to their disparagement.

This year, by accident, I discovered among the attendants at the Home Makers' Conference eight women who hesitatingly admitted they were farmers. Then I knew the time was ripe for organization of a club, and it was done. In unity is strength always, and in this contact with her co-worker the timid farmers will be encouraged and strengthened to greater agricultural feats.

We expect by exchanging experiences, by suggesting new ideas, by relating results of experiments to aid and stimulate each other. We hope to prove that a woman may grasp the details of farming as clearly as she does other business, and that she can come into contact with all its sordid details and yet remain womanly and refined. The woman farmer will be none the less a home maker for she cannot neglect what is inherent and instinctive. She will, too, be a citizen alive to educational and spiritual advancement, for as a person of affairs she should broaden and progress.

A woman's love of nature makes farming a fitting occupation, for it keeps her ''near to Nature's heart,'' while her love for animals gives her especial delight in her flocks and herds.

Already we have had a number of applications for membership in the club. Other states are interested and the influence of our organization is extending beyond our expectations. The woman farmer is a practical fact now and not the picturesque chatelaine of broad acres, whose agent turned over whatever his elastic conscience dictated.

The members of the ''Women Farmers' Club'' must personally superintend and manage their own possessions. They are real tillers of the soil and as such will receive the recognition in the world's work that they richly deserve. They will take their place in the already full ranks of those of whom it is said, ''The noblest thing beneath the sun is woman's duty nobly done!''

WOMEN FARMERS AND THEIR FARMS.

Following the organization of the Missouri Women Farmers' Club, an effort was made to secure a sketch of each of the officers, together with something concerning their farming operations. In this we were partially successful, as is shown by the following:

"FOREST HOME" FARM—MISS PEARLE MITCHELL.

Miss Mitchell.

The farm which I, fourteen years ago, began to manage consists of 320 acres, ten miles west of Columbia on the Rocheport-Columbia gravel road and two miles south of the old famous "Model Farm" of Missouri. My father settled Missouri land and we have the old government grants in our possession. The house is perhaps eighty years old and succeeded the first cabin built on the farm. After my father's death I, having been instructed in his business, more or less superintended the farm for my mother until she became an invalid. Two years before her death I assumed all control. Since then, from my attachment to the old home or my desire for occupation as a definite outlet for my latent energy, I have continued to farm. I raise corn, wheat and hay, rotating my crops according to the demand of the soil. I employ men and personally conduct the work or rent on the shares, always being on the scene of action when seed time and harvest arrive. Between whiles I travel or visit, but when farm business calls I respond. I have cattle and hogs and am now trying sheep in a small way. I find corn and hogs pay me best, and feed one to the other with best results.

This year I am experimenting with corn on land half of which was two years in red clover and the other six months in stock peas, one-half broken in the fall and the other in spring. The fall breaking far surpasses the spring in yield.

When I travel I arrange to have only such crops as mature after I return, and assure the interest of the tenant by letting to him on the shares. Last year, while nine months in the Orient and Europe, I only had hay and corn which I rented on shares. I sold all the corn, stock, etc., that was ready, closed the year's business, departed in January and returned in September to attend to the corn gathering, fattening of hogs and selling of calves.

I have kept up club work. Am Vice-President State U. D. C., President of Church Guild, and belong to several other things. During Stephens' and Dockery's administration was Secretary and a member of Board of Managers of Missouri Colony for Feeble Minded. I was one of three special commissioners to Portland Exposition as hostess of Missouri building under Governor Folk. I was sixteen months making a trip around the world in 1903-1904. These things are not boastfully given, but to show what one—even a woman—can do if she will.

My father was a well known man—Newman T. Mitchell, Sr.—and my mother was Miss Kitty Slack, whose father was one of the first curators of the university. Last year I furnished the reading room in the Y. M. C. A. building as a memorial to them.

I have attended to all my own business since my father's death. My only own brother died five years ago in Columbia, E. L. Mitchell, editor of the Tribune. It is to his memory I placed recently the LaForge window in the Episcopal church. I am interested in all things pertaining to women. I am, as you know, Secretary of the Home Makers' Conference, and one of the Committee on Anti-Tuberculosis measures. I am a graduate of Stephens College and an active member of its alumni class.

From my experience I believe woman can successfully manage a farm, lose nothing of her womanliness, and grow physically, mentally and spiritually from life near to Nature's heart while adding to her finances, if she use thrift, energy and intelligence.

''RIVERCENE''—MISS ALICE E. KINNEY.

Miss Alice E. Kinney of New Franklin, Howard county, Secretary of the Women Farmers' Club, is at home at ''Rivercene,'' a 400-acre Missouri river bottom farm, dripping in fatness. The farm on the north shore of the ''Big Muddy,'' opposite Boonville, has sometimes suffered from the ravages of the river, which in turn adds to its richness.

Miss Kinney's farm was the homestead of the family for many years. In steamboat days her father, Captain Joseph Kinney, was one of the best known river men.

Miss Kinney is a petite, fair, modest woman, shrinking from public notice, but of a pleasing personality. About her there is nothing to indicate the woman farmer, yet a few minutes' conversation with her will prove her familiarity with farm facts. She is enthusiastic over her work, takes an interest in scientific farming, reads agricultural papers, and strives in every possible way to keep abreast of the times.

A few years ago Miss Kinney became widely known as ''the woman who raises hot house hogs.'' On one occasion she used some old greenhouses to shelter the sows and pigs during a snow storm, and finding the scheme such a success, she continued to stick to it.

Miss Kinney is an active, earnest advocate of good roads, and believes that much good can be done in this direction by the Women Farmers' Club, as well as in other ways which affect the lives of women. She, like Miss Mitchell, while succeeding with the soil, gives much of her talent and time to other things. She is a consistent church worker and teaches in the Sunday school. Being gifted in music, she also has a number of music pupils. Then she is treasurer of the State Federation of Women's Clubs and President of the Missouri Home Makers' Conference.

A SCOTLAND COUNTY FARM—MRS. R. B. D. SIMONSON.

Mrs. Simonson.

One of the three executive members of the Women Farmers' Club is Mrs. R. B. D. Simonson, wife of Prof. Simonson, superintendent of schools in Jefferson City. During the winter she keeps house in Jefferson City, but spends the spring and summer season on the 160-acre farm which she bought in Scotland county, Missouri, in 1901, the same year she sold an Illinois farm. Of the farm and its operation Mrs. Simonson writes, "Until March, 1901, this farm was leased to tenants. At that time my son moved on the place, and since Prof. D. H. Doane, of the Department of Agriculture, was secured to plan the farm operations, the place is known as United States Demonstration Farm No. 2. My son and myself, with the co-operation of Prof. Doane, have been operating it less than a year. During this time our energies have been principally directed to preparing for future returns, by repairing buildings and fences, planting crops designed for the improvement of the soil, and securing stock to dispose of a large amount of forage grown on the place. Consequently we have thus far realized no financial returns. Last year we raised Texas Red Rust Proof oats, corn, hay, soy beans and cowpeas, the last of which especially produced abundantly. We have thirty acres in rye, in which clover has been sown. The old meadow, which consists of about twenty-six acres, has been plowed up and will be planted to corn. The remainder of the cultivatable land, comprising between 55 and 60 acres, will, for the 1911 season, be devoted to oats, cowpeas, corn, rape and potatoes. The foregoing constitutes the plan of rotation for next year. The rye and clover take the place of the oats, corn of the cowpeas and meadow, oats of the corn and cowpeas, etc., of the first year."

From this it will be seen that this farm—a Missouri woman farmers' farm—is being scientifically managed, soil building crops playing a prominent part in the rotations as planned.

FROM CITY TO COUNTRY—MRS. CORA F. SHEWELL.

Another member of the Women Farmers' Executive Board is Mrs. Cora F. Shewell of St. Louis, who has a small farm near Shewell Station, Franklin county. Except during winter, when the farm is looked after by a tenant, Mrs. Shewell and children spend their time there. Mrs. Shewell is one of the most active advocates of good roads for child welfare, and is an officer of the State organization of this branch of the Mothers' Congress. How she chanced to become a woman farmer and what she sees in the work is told, as follows:

"When my own health and that of my eldest daughter demanded we go into the country for rest, I tried to find comfortable board for our family of seven. Finding this practically impossible I concluded I would buy a small place near St. Louis where we might spend all of our summers and be easily accessible to my husband's business and lifelong friends. Finding a place of a hundred acres whose location on the Meramec river and Frisco railroad, on the crest of a small hill which gives us a wide outlook over the country, transportation facilities and the pleasures a town affords, I purchased it, though much larger than I needed and of no farming value. The first summer we spent contentedly, purchasing our milk, vegetables and fruits from nearby farmers. This being by no means satisfactory, as they raised barely enough for their own use, the second year we had a cow and a small garden. Some few things did well, but the land was so poor the corn was only about two feet and a half high, with the ears coming out on the stalks only a few inches above the ground. This drew my attention to the question of increasing the fertility of my soil and giving some feed for stock. Last year I planted clover and cowpeas—used 250 pounds of commercial fertilizer on my garden and had all the vegetables I used during the summer and plenty to ship to St. Louis in sacks and cans to last us during the winter. The second year I rented a small piece of bottom land on shares and received my third of a crop of wheat, which I judged seven bushels to the acre. Last year corn at thirty-four bushels to the acre was raised there, which, with the fodder and a little bran and linseed meal, has sufficed to feed my cow and two-year-old and yearling. I have only about twenty acres cleared which now has been under clover one or two years, and will this year be put early in corn to be sowed to cowpeas at the last cultivation and then winter rye will follow. Having visited Columbia for Farmers' Week I am now really going to do some farming, I hope, with profit. I have a two-hundred tree apple orchard, and that will be planted in melons and sweet and Irish potatoes, the former of which I have raised very successfully. I have a fine three-hundred-plant asparagus bed from which I will begin to cut this year, and from my 20 plum and 26 peach trees hope to have a good crop if late freezes and hails miss us."

The Missouri Corn Growers' Association.

Motto: "Increase the yield—improve the quality."

OFFICERS OF THE ASSOCIATION.

F. H. Crowell, Butler, President.
C. B. Hutchison, Columbia, Secretary-Treasurer.
T. R. Douglass, Columbia, Assistant Secretary.

VICE PRESIDENTS.

O. J. White, Fairfax.
W. H. Brown, Clarksville.
Christ. Ohlendorf, Boonville.
M. McCauley, Doniphan.
Sanford Smith, Reeds.

(C. B. Hutchison, Assistant Professor of Agronomy, University of Missouri.)
Secretary Missouri Corn Growers' Association.

C. B. Hutchison.

The Missouri Corn Growers' Association was organized in 1903 by the students of the College of Agriculture of the University of Missouri to promote and further the improvement of corn growing in Missouri. At the time of organization little systematic effort was being made to improve the corn crop of Missouri except by a few individuals, and it was with the idea of bringing these men together in a more effective working body that this organization was founded. Starting with a few students as members, the Association has grown and prospered until now its membership includes the foremost corn growers and breeders of this State.

The Association has always had an annual meeting in connection with the Corn Show, both of which are held each year during Farmers' Week at the College of Agriculture. The Association has had an important part in the development of Farmers' Week and was one of the first organizations of this kind to establish the custom of having its annual meeting at this time. At these annual meetings papers are read and subjects, relating to the growing and breeding of corn, discussed by the most noted specialists in this work that the nation affords. These meetings have proven to be a combined school and conference for Missouri corn growers, and much good to the cause of Agriculture in general has resulted from them.

WHAT THE ASSOCIATION HAS ACCOMPLISHED.

Missouri has made rapid progress in the production of corn since the Corn Growers' Association was organized, which has been due in no small way to its efforts. It has brought together the leading men in the State who are interested in corn improvement and bound them together in an efficient working body that has done much to increase the yield and improve the quality of Missouri corn.

It has developed a corn score card and established a standard of judging, and has made possible the teaching of such standards through local and State corn shows.

It has brought into existence an annual meeting of the corn men of the State that is unequaled for the interest manifested. At these meetings the nation's foremost authorities on corn present the most up to date methods and ideas for improving our corn crop.

It has organized an annual State Corn Show, that both in point of number of exhibits, and quality of corn shown, is second to none in the whole country.

In 1906 it organized, in co-operation with the College of Agriculture and the State Board of Agriculture, the Missouri Boys' Corn Growing Contest, which has done more to introduce the use of pure seed of standard varieties, and to create a greater interest in better corn than any other movement that was ever started along this line. Last year more than 2,500 boys were enrolled in this contest and much good is being accomplished through this means of showing the boys some of the opportunities that intelligent farming affords.

It has arranged an annual examination for certifying corn judges and issues a certificate to each of its members who successfully pass this examination.

It has created an interest in improved seed which is meaning much to the argicultural interests of the State, not only in corn growing, but other phases of farming operations as well.

WHAT THE ASSOCIATION IS WORKING TO ACCOMPLISH.

To eliminate poor varieties of grain from the State and to bring about the production of many high yielding strains of all of the cereal crops.

To disseminate among its members a better knowledge of corn as well as of other grains and forage crops and thus improve agricultural methods throughout the State.

To hold an annual grain exhibit which shall surpass anything of its kind in the United States.

To establish a farm boys' agricultural organization with a grain growing contest of mammoth proportions.

To secure an active membership of 1,000 Missouri farmers.

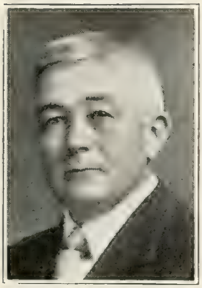
Every Missouri farmer who is interested in better agricultural conditions will profit greatly by membership in the Association. Every old member should bring in at least one new member this year and help to make this the greatest year in the history of the Association and the Corn Show next year the greatest one ever held.

ANNUAL ADDRESS OF THE PRESIDENT.

(F. H. Crowell, Butler.)

It affords me much satisfaction as I glance over this splendid audience to note what an interest is being taken in the growing of corn.

When we realize that but seven short years ago the first meeting was held in one of the class rooms in the old Agricultural building, attended by a few earnest students and seven or eight enthusiastic growers of seed corn, the contrast is so great that one hesitates to prophecy for the future.


F. H. Crowell.

The members of the Corn Growers' Association of Missouri may certainly congratulate themselves on the fine exhibit of corn displayed in another part of this building. This is by far the best and largest show we have ever held. There are specimens gathered from the four corners of our State, all of excellent quality and selected with care by the exhibitors who are determined to secure one or more of the valuable premiums offered. Permit me at this time, and in this public manner, to thank the donors of the various premiums for their liberality and to assure them that the Association fully appreciates all they have done in helping to make our show a success.

When we consider the wonderful increase in the average number of bushels of the corn crop of 1910 over the average for the preceding ten years we may, I think, be pardoned a little egotism if we claim a large share of credit for the result. Taking the total acreage of the State as a basis, we find that in round numbers, there has been an increase of twenty-seven millions of bushels. Figured at the rate of forty cents a bushel makes the large sum of ten million eight hundred thousand dollars in increased wealth for this commonwealth through the careful selection of seed and the cultivation of this great plant. This sum would do wonders in extending the work of our Association. Through the assistance of the College of Agriculture and the State Board of Agriculture, we have been able to maintain our organization and extend its scope, but some provision should be made by the present legislature for this Association to receive a sum sufficient for its needs so that the good work already started may grow each year and the taxable wealth of our State be much enlarged as the years roll on.

The plan adopted two years ago of having county and local shows for boys and young men, the principal premium to be a scholarship to the short course at the College of Agriculture, has been a wonderful success and is so far reaching in its possibilities that no one can surmise just what the ultimate results will be. This plan brings the youth of our State in close touch with our University, and it must of necessity stimulate them to greater interest in the science of Agriculture. As they return to their homes in the various sections of the State we feel assured that the time spent at the University will help maintain the high standard of citizenship of this great Commonwealth. It is the plan of the present officers of the Association to continue this program during the coming year.

During the year 1910, the ''Frisco'' Railroad held these contests in each of the forty-five counties through which the road runs and sent a young man from each of these counties to the University and paid all of his expenses for the fourteen weeks' short winter course in Agriculture. These forty-five young men have influenced others, so that there are now one hundred and twelve students attending the short course directly influenced by this action of the ''Frisco'' road. This was certainly a good business investment for the company and no doubt the management will in the near future reap substantial financial benefit from such foresight. It is my understanding that this policy is to be continued for the coming year. The Corn Growers' Association takes this occasion to express to the officers of the ''Frisco'' railroad, thanks for this public spirited action.

Allow me to suggest that while we have up to the present devoted our time to the growing and selecting of seed corn, yet the day is near when we must take in the whole range of cereals, wheat, oats, all the small grains as well as the grasses, thus making our association a grain growers' in place of a corn growers' association. In thus enlarging the scope of our work more funds would be required but the profits to the State would be so large that only a very narrow-minded person would object to the expenditure. This would entail additional work for our secretary, which is a matter of regret to me, as we all know that our very efficient secretary, Mr. C. B. Hutchison, has attended to the duties of his office during the year in addition to his class work in the College of Agriculture. I take pleasure now in thanking him for his services and regret that thanks is all the compensation he is to receive from the office.

As we look backward and review the work of our Association, the trials and tribulations of its officers, their earnest efforts, their sacrifices of time and money, I feel how much I have lacked of doing my full duty, yet we look into the future with every confidence that this is only the beginning of the glorious work which this Association is destined to accomplish. Let us redouble our efforts in the future, so that every citizen of this great State will be as proud of this Association as are the members at the present time.

INCREASING THE YIELD OF OUR CEREAL CROPS.

(E. G. Montgomery, Experimental Agronomy, University of Nebraska. Address Delivered at Columbia During Missouri Farmers' Week.)

E. G. Montgomery.

Increasing the yield of cereal crops resolves itself into three principal lines:

1. The selection of best varieties.
2. Improvement of these varieties, either by the acclimatization or some method of plant breeding.
3. Improved soil culture.

The importance of using the right varieties is well illustrated by the results of variety tests conducted at the Nebraska Experiment Station. Some twenty-five varieties of corn have been tested. As an example the average yields of the two best and the two poorest yielding varieties for four years are as follows:

CORN.

	1902.	1903.	1904.	1905.	Average
Hogue's Yellow Dent	75.4	75.1	80.6	65.0	74.0
Ried's Yellow Dent	68.9	72.2	82.8	60.8	71.0
Riley's Favorite	53.2	51.0	80.4	56.1	60.1
Silver Mine	50.0	58.1	65.1	63.4	59.1

State average, 31 bushels.

The two poorest yielding varieties are not by any means the most inferior varieties we have grown at the Station, since we usually drop very poor varieties of corn after one or two years' test. The variety that has been carried as much as four or five years is at least up to the average, or above it. It will be noted that the average yield of the two best varieties is twelve bushels above the average yield of the two poorest. When we remember that all of the varieties were grown under exactly the same conditions, and that the two best varieties cost no more to plant, cultivate or harvest, and yet gave a clear average of twelve bushels to the acre better yield for a period of four years, the value of replacing the poorest varieties by the best will be seen.

WINTER WHEAT AND OATS.

With winter wheat and oats similar results covering a period of five years have also been obtained, as is shown by the following tables:

WHEAT.

	1902.	1093.	1904.	1905.	1906.	Avg.
Turkey Red	30.0	31.0	17.8	36.0	62.0	35.3
Big Frame	10.8	27.3	17.5	25.0	54.0	26.9
Yarsolav	29.9	16.3	4.5	21.5	45.1	23.4
Girka	26.2	25.0	*...	21.8	47.5	24.1

State average, 18.8 bushels.
*Not thrashed.

OATS.

	1902.	1903.	1904.	1905.	1906.	Avg.
Kherson	42.0	68.0	53.0	82.0	50.0	59.0
Texas Red	33.0	57.0	40.0	81.0	48.0	52.00
American Banner	....	45.0	32.0	76.0	47.0	50.0
Im. Price Cluster	......	32.0	27.0	71.0	42.0	43.0

As with corn, the two best varieties in each case are compared with the poorest varieties grown during that period. It will be noted that the best variety of winter wheat has out yielded the two poorest varieties by an average of eleven bushels to the acre, while the best variety of oats has out yielded the poorest variety by sixteen bushels to the acre.

At the Experiment Station farm, by growing the best variety of corn, wheat and oats, instead of one of the poorest varieties in each case, we would get twelve bushels more per acre each year, or a total for five years of sixty bushels; for the wheat, we would get a total of fifty-five bushels more per acre, and for the oats a total of eighty bushels more per acre. This large total of increased yield per acre is all clear gain since it costs no more to grow an acre of good variety in the place of a poor variety. Sometimes it even costs less, since they are usually more vigorous and keep down the weeds better. The question which at once arises is where and how shall we secure the best varieties. In the first place, the varieties that do well in one locality are not always varieties that do best in another. For example, Hogue's Yellow Dent has given good results at the Experiment Station farm, but north of the Platte river Reid's Yellow Dent seems to be much the better corn; also in the western part of the State there are some varieties that seem to do better than either of these. The best varieties for every section of the State must be carefully worked out by comparative tests. Also, there are even several strains of the same variety. For example, the strain of Silver Mine, referred to in the above chart has not given very good yields, and yet other strains of Silver Mine have been found to give good results.

The importance of having seed thoroughly adapted to our climate and soil conditions cannot be too strongly urged in Nebraska, especially is this true in Central and Western Nebraska. Here we have a soil usually light, and even more or less sandy, a medium to light rainfall and dry temperature. In fact, conditions are so different in many respects that it has been found to take two or three years for corn brought from regions only a few hundred miles east to become thoroughly adapted. For a number of years we have been growing corn obtained from various places in other states and this State to test the value of acclimatization. In many cases we have had the seed of the same variety coming from two different sources planted side by side. The result of such tests for three years is shown by the following table:

Name and place of origin.		1903.	1904.	1905.	Avg.	Difference.
Leaming.	**Nebraska**	....	95.2	69.8	82.5	
	Illinois	....	76.6	69.8	73.2	9.3
Silver Mine	**Nebraska**	....	70.0	76.1	73.0	
	Illinois	....	65.1	63.4	64.2	8.8
Snowflake White	**Nebraska**	73.7	84.8	74.5	77.7	
	Illinois	68.7	72.8	67.1	69.5	8.2
Boone Co. White	**Nebraska**	....	76.2	....	76.2	
	Illinois	....	68.9	....	68.9	7.3
Ried's Yellow Dent	**Nebraska**	....	87.1	63.4	75.2	
	Illinois	....	82.8	60.8	71.8	3.4
Early Yellow Rose	**Nebraska**	68.1	67.9	75.1	70.3	
	Illinois	62.1	76.9	63.5	67.5	2.81
Neb. White Prize, Saline county		....	89.2	79.0	84.2	
Neb. White Prize, Washington county		....	82.1	79.0	80.5	3.7
Silver Mine, Saline county		....	70.0	76.1	73.3	
Silver Mine, Washington county		....	65.5	61.3	63.4	9.6
Iowa Mine, Buffalo county		61.5	84.9	73.6	73.3	
Iowa Gold Mine, Washington county		60.9	57.9	....	59.4	13.9

At the top of the list it will be noted are six leading varieties of corn where Iowa and Illinois grown seed are compared with Nebraska grown seed. In every case the Nebraska grown seed has yielded the best by a margin of three to nine bushels per acre. This difference in favor of home grown seed is probably due to the fact that in moving corn from Illinois with its heavier soil, greater rainfall and more humid air, to Nebraska, with an entirely different soil, less rainfall and a much drier air, the corn suffers by the change. It takes some years before it is thoroughly acclimated, and can yield as well as home grown corn. We will also find the same difference grown in Eastern, Western and Central Nebraska. Seed of two varieties, Nebraska White Prize and Silver Mine, was obtained from Saline county, Nebraska, about twenty miles from the Experiment Station, and from Washington county, which is one of the river counties. In both cases the Saline county corn outyielded the other, due to the fact that it was grown under conditions of soil and climate more like those at the Experiment Station. In another case, Iowa Gold Mine from Buffalo and Washington counties was grown side by side, giving very much increased yield from the Buffalo county seed.

Another striking example of the effect of acclimatization is shown by some results secured with show corn from the National Corn Show at Omaha—the results of which are shown in the following table:

ACCLIMATIZATION OF CORN.

Comparison of unacclimated corn with native varieties:

	Yield in bu. per acre.
Five prize winning exhibits from National Corn Show in 1908. Grown in Illinois, Indiana and Ohio	39.8
Five standard varieties of well selected corn from Nebraska growers	45.6
Seven lots of Native Corn secured from farmers near the Experiment Station	48.8

The five plants of show corn were from prize winning samples but practically all of them came from Iowa, Illinois and Indiana. While these were fine specimens, and undoubtedly very productive corn on the farms on which they were grown, yet they gave an average yield of 39.8 bushels at Lincoln. The six varieties of corn secured from Nebraska growers, and all of them improved strains of corn, averaged 45.4 bushels, an increase of 6.4 bushels per acre from the Nebraska grown strains of improved corn. A set of corn secured from farmers in the neighborhood of the Experiment Station averaged 48 bushels, this being an increase over the corn secured from the best growers in the State. I think, however, the difference in yield represented the difference of acclimatization. The show corn, while productive where it has been developed, was at a disadvantage when grown at the Nebraska Experiment Station, and gave a rather poor yield. If this seed had been grown at the Station it would have improved in yield. The seed secured from our best growers, while acclimated to Nebraska, was grown 50 or 75 miles from the Station and was not fully adapted to local conditions. However, the local varieties of corn grown within three or four miles of the Station, being fully acclimated, were capable of making their best yields. There is no evidence that with any of our cereal crops—corn, wheat or oats—that there is any such a thing as "running out" of a strain, due to long continual growth in the neighborhood. Results secured by exchanging spring wheat with the North Dakota Experiment Station and the Minnesota Experiment Station, covering several years, showed in practically every case an advantage for the home grown seed.

IMPROVEMENT OF CEREALS BY BREEDING AND SELECTION.

It would seem, therefore, that after a thorough search had been made of the best varieties of the region, and these varieties fully acclimated, that no further increase in productiveness could be secured by this means unless some system of selection can be found for improving the variety. We call this method of improvement plant breeding, and I wish to show some data giving result of our plant-breeding work with corn and wheat.

In 1903, we selected about 80 ears of corn and planted each to a separate row. There was a great variation of yield in each row, but about 17 of the rows yielded 90 bushels or more per acre. The corn from these rows was kept for seed and six ears selected from each one. The six ears from each high yielding row were again planted, an ear to a row, and selection continued in the same way the second year. This method of selection was kept up for five years and then the selected corn which had been improved by the ear to row method was carefully compared with the original corn from which the ears had been selected for two years. The results are shown in the following table:

	1907. Bushels.	1908. Bushels.	Average. Bushels.
Selected strains	82	66	74
Checks (original stock)	72.5	59	65.7
Difference	9.5	7	8.3

This shows that the corn selected by the ear to row method had made an average gain of 8.3 bushels per acre over result of selection.

In another ear to row experiment, started in the year 1906 and carried on for two years, even more striking results were secured. In this second experiment 200 ears were planted in 1906, but only half an ear to a row. In 1907, the remainder of the ear was used for seed and each planted in a separate row in order to check the results secured in 1906. Not all the ears yielding high in 1906, yielded high in 1907, as there was some difference in the two seasons, and all ears did not seem to do equally well in different seasons. However, there were four ears out of the 200 that gave very high yields both seasons, and the crop received from these four was saved for further test. The result of this test in 1908, is shown in the following table:

Table III. Comparative yield of selected types in 1908. (Class II.)

	Bushels.
Avg. yield of remnants, 4 best ears	70
Avg. yield of 1907 progeny, 4 best ears	68
Avg. yield of check plats (original stocks)	59
Avg. yield of remnants, 9 poorest ears	56

The 1903 Class I. selection under same conditions yielded as follows (See table I.)

Avg. yield remnants, 5 best ears	73
Avg. yield 1907 progeny, 5 best ears	66
Avg. yield check plats	59

There was a small remnant of each of these four best ears still left and they gave a good yield. The 1907 progeny of these ears yielded 68 bushels, while the original stock from which the corn was selected, yielded only 59 bushels. This shows a gain of 9 bushels per acre as a result of ear to row test. Further details in regard to carrying on tests in these experiments are shown in Bulletin No. 12, of the Nebraska Station.

Results of wheat breeding have been equally satisfactory and a similar method has been used. In this test a large number of wheat plants were first selected from a field of Turkey Red in 1902. Each plant was planted separately. The product of each plant was again planted separately the next year and so on for several years until quite a supply of seed had been secured from each original plan, and the product of each plant is called a pure strain. However, as the work went on from year to year, those pure strains which did not seem promising, were discarded. By the fall of 1906 we had enough seed from 26 of these pure strains to plant in large field plats. Each strain was planted in a tenth acre plat, and in most cases repeated two or three times. Every fifth plat was made a check plat—this plat being planted with the original Turkey wheat from which selection was made. This test has been carried on for four years in the field plats and has given some very remarkable variations in yield, as shown by the following table:

CLASS IV. '02. FIELD PLATS, 1907, '08, '09. '10.
FOUR YEAR AVERAGE.

Family number.	Total Plats.	Yield.	Rank.
48	9	40.75	1
287	12	40.59	2
42	5	39.90	3
312	9	39.21	4
425	8	39.18	5
556	5	38.86	6
225	10	38.78	7
215	8	38.64	8
47	39	38.50	9
3	23	38.48	10
464	5	38.32	11
391	5	37.96	12
221	12	36.57	13
313	5	36.27	14
377	5	36.13	15
206	5	36.12	16
314	8	35.22	17
Check	47	35.18	17½
168	8	34.84	18
526	5	34.20	19
379	5	33.56	20
216	8	33.46	21
209	8	32.93	22
37	5	32.58	23
102	5	31.95	24
2	8	31.88	25
328	5	28.88	26

The best pure strain has given an average yield of 40.75 bushels for four years, while the poorest strains have averaged 28.88, a difference of 12 bushels to the acre. It is understood that the check plat has yielded 35 bushels, or is just about half way between the highest and lowest strains. In other words, an ordinary wheat field seems to be made up of a mixture of a great many strains of wheat, some of which are good yielders and some of which are poor yielders. By selecting out single plants and keeping the product of each plant separate, we are able to isolate these poor strains and after tests are made we can rogue out poor yielders and save only the good yielders.

It will be understood that by these methods of plant breeding, little attention is paid to outward appearance. For example, by the ear row selection of corn breeding, all types of ears are planted and there seems to be no relation between the outward appearance of an ear and its ability to yield. It is the same way with wheat plants—there is no way of telling by the appearance of a wheat plant whether it will make a good yielding or a poor yielding strain. The only sure way, apparently, for improving the yield of plants is to follow the method of selecting individuals and testing each individual for its yielding power. This is entirely different from the old time method, in going by appearance in selecting rather than the yield test.

FERTILITY OF THE SOIL.

However, the best seed that can be secured will not make a crop unless attention is given to the soil. In every county there are farmers who secure double the yield of the average farmer in their county, and the large increase in usually due to their better methods of maintaining the fertility of the land and their better tillage. As an example of this, co-operative corn experiments were carried on with about 100 farmers in eastern Nebraska for a period of five years. A large number of these men carried the experiment continuously for that period. At the end of the five years it was found that the experimenters averaged 54 bushels to the acre for the five years, and according to the official records the average yields of the counties in which they were living were 36 bushels per acre. In other words, the best farmers in the county were averaging 18 bushels per acre more than the average farmer. The possibility of increasing our yield of corn to 50 or 60 bushels to the acre seems very possible if the average farmer will do as well as the best farmer in every neighborhood. As an example, however, of how far increases might be secured, it was found that during the same period the average yield of corn at the Experiment Station had been 72 bushels while the average yield of corn in Lancaster county was 33 bushels—the Experiment Station having more than double as much corn per acre as the county. No methods were used at the Experiment Station that were not thoroughly practical to use on every farm, and this would indicate the possibility of doubling our yield of corn if ordinary improved methods were used. One of the simplest ways of increasing the yield of all cereals is the liberal use of clover and alfalfa. An inquiry made by the Farm Management department of the Nebraska University, among farmers of the State, revealed that cereal crops grown after clover or alfalfa were usually doubled in yield the first two or three years. For example, 31 farmers who had recently plowed up clover or alfalfa sod reported 68 bushels per acre following clover or alfalfa as compared with 34 bushels to the acre on adjacent land which had been left continuously to grain. Many of our farmers have been complaining for the last few years that their seed oats was "running out," but this is probably due to the "running out" of soil rather than the seed. During the past two years I have heard of a number of oat yields of 90 to 100 bushels to the acre where the land had been recently broken up from clover or alfalfa, indicating that our varieties of oats will yield all right if given the proper soil condition.

To sum up, I would say that the essential principles for increasing our yield of grain are—first, to find the best varieties suited to our conditions, and second—when these varieties have been found and become thoroughly adapted to our farm conditions, they should not be discarded every few years for new seed, as the acclimated varieties will undoubtedly give better yields than seed brought from a distance. However, if the Experiment Station or some skillful grower is improving the variety by breeding, the improved stock should be secured if possible. We should not put all our faith, however, in improved seed alone, as it is necessary to furnish this improved seed a fertile soil in order that it may be productive.

SOME REQUIREMENTS FOR LARGER YIELDS OF CORN.

(Prof. C. G. Williams, Ohio Experiment Station. Address Delivered at Columbia During Missouri Farmers' Week.)

C. G. Williams.

In speaking upon the subject announced I am going to assume that we all want to improve our corn yields, and I shall further assume that most of us can so improve. With the ten-year average yield of the United States at a little over 25 bushels per acre, with your own at a litle over 28 (not counting your recent advance), with the yields of Ohio, Illinois and Iowa running around 32 to 35 bushels, there would seem to be plenty of room for improvement. In spite of the interest and enthusiasm which we have been stirring up in most of our states the last few years, the facts are that we have not been growing as much corn per acre in the United States the last twenty years as we grew in the preceding twenty years. There has actually been a falling off of .7 of a bushel per acre in the last twenty years as compared with the preceding twenty. What is the cause of this decrease? Ask the pioneer who left New England in the thirties and moved to Ohio and Indiana and who, a few years later, moved on to Illinois and Missouri and Kansas, and whose children are today leaving these states for Alberta—the man, if you please, who farms the new out of the soil and moves on. This decline is not great—.7 of a bushel—but it would have been greater but for such work as you have been doing here in Missouri, and such work as has been done in other states along the lines of improving the seed and the culture of corn. This loss is real and important. It means, gentlemen, the gradual impoverishment of our soil, and right here is the first requirement, the first chance for improvement if we would increase our corn yields.

Now, what can we do along this line? In the first place, I want to call your attention to the value of a good, systematic rotation of crops. At the Ohio Experiment Station we began some 17 or 18 years ago a series of experiments in which we have grown corn in continuous culture —corn, corn, corn, and have kept it up for 17 years now; and right along side on similar land we have grown corn under exactly the same conditions aside from a rotation of corn, oats, wheat, clover and timothy. I want to give you some of the results of these two systems of farming that you may see whither you are tending, and I want to give these yields in periods of five years each. The first five years that we grew corn without any fertilizer or manure, we got an average yield of 26 bushels per acre. We kept that right up—no treatment with fertilizer or manure—simply corn, corn, corn. The second five years the average was 17 bushels per acre. Going down hill, you see. And the third five years we averaged 10.4 bushels per acre, and the end is not yet—still going down. Now, in a five-year rotation of corn, oats, wheat, clover and timothy the yield has been 31.9 bushels for the first period, 30.8 for the second and 31.1 for the third—practically standing on a dead level. In other words, the rotation of crops has made the difference between that marked decline and the dead level. The soil where these experiments were conducted was not a rich soil to begin with. These yields, of course, are low.

It is evident that such soil needs treatment of some sort. Let's see what effect stable manure will have. On some of those continuous plots we use five tons of manure every year. We started off the first five years with an average yield of 43 bushels per acre. The second five years there was an average of 40 bushels—going down under continuous culture in spite of the fact that we used the manure, and the third five years we dropped to 34½ bushels.

Under rotation we did not use as much manure in the five years as in continuous culture, applying only 16 tons per rotation period, whereas in continuous culture we used 25 tons every five years—but note the very different results.

Under rotation with manure, as stated, we started off with a little lower yield—40.7 bushels. But the second period came up to 49.5 and the third period averaged 59.8 bushels—practically 60 bushels. You see what a good rotation means. In the course of the 15 years we applied under continuous culture 75 tons of manure, and only 48 tons in the rotation, and yet in spite of that 75 tons our yields declined 20 per cent., whereas, with only a little more than one-half the amount of manure under rotation our yields increased 47 per cent. in round numbers. I have mentioned a five-year rotation. I do not mean that that is necessarily the ideal rotation. We have secured better yields of corn under a shorter rotation. For instance, under a three-year rotation we have a 12-year average yield of 64½ bushels. I simply want to get before you what I take to be a fact—that it pays to practice a good rotation of crops.

Now I think farmers pretty generally understand that rotation of crops pays. They also understand that it pays to husband the manure product of the farm and make intelligent use of it. Some of our Ohio farmers, however, have been slow in learning that the element phosphorous or phosphoric acid can be used with profit in their farming. The Ohio station has been conducting some experiments for this same period—17 years—in the use of phosphorous. We have used different carriers but in the main we have used the treated rock phosphate, commonly called acid phosphate. Where we have used 320 pounds of acid phosphate per acre in the five year rotation noted above, at a cost of $2.40, we have secured a net return from this investment of $14.08. Of course you want to know at what price we figured our increase of crops to get this return. The figures may be a little high for you. We figured our increase of corn at 40 cents a bushel, wheat at 80 cents, oats at 30 cents, hay at $8, straw at $2, stover at $3. I expect that the price of the stover will be a stumbling block here, but it is worth more than that with us. Now, a farmer who can invest $2.40 and get a net return of $14 would surely be satisfied. If you want to figure the per cent. of profit on the investment it will be 586 per cent. That's a little better than stock in "Standard Oil," isn't it?

The figures that I have given you are for the use of acid phosphate alone. We did not get as large corn yields as we want, however, with the use of acid phosphate alone. Where we used 8 tons of manure per acre once in the rotation and the same amount of acid phosphate with it, we raised our corn yields considerably but the net profit per acre was not quite as great—it was $10.66. We also used the untreated rock, mixing it directly with manure. When we used 320 pounds of the latter we got a little larger net profit—$11.78; but I want to sound this word of caution in the use of untreated phosphate. One should use it in connection with decaying organic matter. If any of you are in the habit of using commercial fertilizers on wheat, drilling the fertilizer with the wreat, you will be greatly disappointed with the results if you use the untreated rock phosphate or floats in like manner, whereas if you will mix the fertilizer directly with the manure before you apply it you will get good returns. We may conclude, I think, that for a great many farmers, manure and phosphorous will give profitable returns in increased yields of corn and other crops.

LIME.

There are a great many soils in Ohio, and likely also in Missouri where lime is needed in addition to these treatments. The soil at the Ohio station is remarkably deficient in lime, and if I had the time to put the figures on the board in detail I could tell you a wonderful story. I may say, in brief, that on our soil we have not failed to receive a profitable return from the use of lime. We have found it especially essential where acid phosphate has been used for a long series of years, for acid phosphate is exhaustive of the lime of the soil—that is one objection to it. One is justified in using acid phosphate where a soluble and cheap carrier of phosphorus is required, but he must use more lime unless he is using it on a soil that is very rich in lime. It will eat up lime—not exceedingly fast, but faster than other carriers. Where we had used lime on acid phosphate plots we increased the yield of clover 70 per cent. On our plots that received acid phosphate and muriate of potash we increased the yield 84 per cent. Where we used sulphate of ammonia and acid phosphate, lime increased the clover yield 118 per cent. Sulphate of ammonia carries sulphuric acid and accordingly increases the acidity of the soil. With the use of bone in the place of acid phosphate the clover yield was greater than with any other application save manure, yet in the case of the use of either bone mixtures or manure the addition of lime gave a still higher yield and a profitable increase.

As a result of following good systems of rotation and the intelligent conservation and use of the manure product of the farm, supplemented with phosphorous and lime where the latter is needed, I believe there is a chance to increase the corn yield of the United States a good many bushels per acre, and this increase may be secured at a handsome profit.

Now, there are some lines of improvement along what we may call the improvement of cultural conditions. First, I will speak of the matter of drainage. We have just thousands of farmers in Ohio who are planting corn year after year on land where they absolutely know they will suffer a loss from 10 to 90 per cent. because of the need of drainage. If we happen to have wet weather for two months after corn planting the crop is lost, and they know it will be lost. Men who would not think of putting out a crop without fertilizing it to some extent go right along planting on land that needs tile drainage seriously. They sort of console themselves with the thought, when they lose the crop, that it is a dispensation of Providence, when the facts in the case are that this loss is due to their dispensing with tile. Providence hasn't much to do with it.

The matter of early and thorough preparation of the seed bed for corn is appreciated by all and I will not take time to discuss it. We do not all, however, appreciate the value of planting corn in good season. We have farmers who do not get in a hurry to plant corn until about the first of June. Now, I shall have nothing to say about the proper day of planting, but I do want to impress upon you that it pays to be on time—whatever the proper time is in different sections of the country. In our Station experiments, we have been beginning our planting at the earliest possible date, some years two, three and four weeks before many farmers would begin, and we plant a plot each week on into June. And I want to say that as an average of four years we find it is the early planted corn (where conditions will permit), that has produced the most bushels per acre and corn of the best quality. Why, some years—in fact as an average of four years—corn planted the first of June has averaged over 30 per cent. of water at husking time in November, whereas, corn planted a month earlier averaged about 16 to 17 per cent. in our humid climate. I just want to drop that point—you can apply it as it suits your conditions.

A good many of us could improve our yields of corn if we had better stands of corn. What is a proper stand? For our Ohio conditions it is about 12,000 plants per acre. In very extended experiments on the prairie soil of Illinois, taking a series of years, the maximum yield was produced by between 11 and 12 thousand plants per acre, and the second best yield with a trifle over 12,000. I do not know what sort of a stand you have in Missouri, but Ohio doesn't come anywhere near averaging that.

I want to say a word with regard to the early cultivation of corn. I believe that we ought to run over our corn fields at least once before the corn comes up, and when we plant early and the weather is a little damp and cool, and the corn comes up slowly, I would run over it twice with a light smoothing harrow; but if the weather is warmer you will get over it but once. I believe it is the best thing the corn grower can do—to run over it at least once before the corn comes up.

Some of you can very likely improve your corn yields by getting better varieties than you now have. But here is a chance to make serious mistakes: You come up here to the corn show, see a fine exhibit of corn that has won first prize, and you think that first prize is a pretty nice thing—some honor connected with it. And you think further, that if you had some of that corn on your farm you could increase your yields and possibly win some prizes yourself. Well, now that may be true, but the chances are, it is not. I would go slow. Corn must be adapted to the locality where it is to be grown. You send 200 or 500 miles away for corn or sometimes you get it in the same county, but grown under very different conditions than your own—perhaps on a rich bottom land when you have a thin upland. Corn changed in this way will result disastrously, as a rule. I presume your Station here makes some such tests as we do. We gather corn from all over the country and bring it to the Station and plant it side by side. We send to Kansas every year and get some of their best corn, and we send to Illinois to some good breeder of Reid's Yellow Dent and get some fresh seed, and then we come nearer and nearer home picking up corn. As we plant this corn side by side, and what we find, is this: That the varieties we bring from farthest away from home do the poorest. We will get a great growth of fodder but very poor, wet corn. In the case of the corn brought in from Kansas we found that in every 100 pounds of the corn we have 33 pounds of water. Now we are not growing corn for water. We are growing it for the dry matter there is in it. And the nearer we came home with the different varieties the more dry matter we found in 100 pounds of corn, and the better the yield, too. And this corn that was brought from a distance, even after thoroughly drying out the following spring, was not first class corn then. When we tested it we found it tested only 49 pounds per bushel, when it ought to have tested 55 or 56 pounds according to our standard. So you see that while it is possible for a good many of us to improve yields we have got to use great caution. Consult your Experiment Station and your State Board of Agriculture and make your changes with care. Some man has a pretty good variety of corn but it does not quite suit him—possibly it is a little too late or a little too early to suit him. We can take these varieties that do not quite fit our conditions and make them over with a little careful selection. If I had my chart here I would show you the variation we found in these different varieties we brought in from all over the country, the variation in yield, in test per bushel; then I would show you the variation which we found in 50 ears of corn, all of one variety, and would you believe that we found in many cases greater variation in these 50 ears, all of one variety and all grown in one place, than we found in these dozen varieties picked up all the way from Kansas to Ohio. So you see what a chance for changing your variety it gives you if you will get to working with individual ears, going to your fields in September and selecting for what you want—for early maturity, if that's what you want; for low ears or high ears, whichever you want. You can make changes year by year, as I should like to show you if I had time.

DISCUSSION.

Q. Don't you think there is a great deal of corn lost by being planted too thick?

A. It is possible. With five plants per hill in rows 3½ feet apart we secured, as a five year average, a little over 60 bushels of shelled corn per acre. With three plants per hill we averaged 59 bushels. Now five plants is too thick, in my judgment, and yet there are the figures on shelled corn.

Q. How did the quality compare?

A. If you mean size of ear, the ears were of course, much smaller. The shelled corn, however, was equally good. The five plants per hill in rows 3½ feet apart would give you 17,000 plants per acre. I don't recommend that many. There are more farmers in our State with less than 7,000 plants per acre than there are with 12,000. The latter figure is about right.

Q. How thick would you recommend drill corn?

A. On good rich land I would plant a kernel every 12 inches. We have averaged 4½ bushels more shelled corn per acre with corn in drills than in hills where we had the same number of plants per acre. That is not very much more, but it amounts to something.

Q. In regard to commercial fertilizers, don't you have to try them for a good many years to know whether the results are permanent?

A. We have a series of plots that have been treated with commercial fertilizers for 17 years, and the yields have gradually increased just as they have with manure. This does not mean that it will pay a man to be careless with his manure product and buy fertilizers; but he can supplement the manure product of the farm with fertilizers.

Q. What is the best way to apply a commercial fertilizer?

A. Our experience is that if you are going to use very much—much above 100 pounds—it is better to drill it all through the soil before you plant the corn. The corn roots will find it all right. If you simply want to give the corn a hurry start so as to get it out of the way of weeds and insects, you can use 75 to 100 pounds with the planter with good results. I have sometimes thought this amount paid on land that was rich enough to produce a maximum crop simply from the benefit we get from hurrying it along and getting it to the point where we can cultivate it a few days earlier.

Q. Do you consider 200 pounds too much?

A. That is a reasonable amount. You need not be afraid to use more.

Q. What kind of land are you going to put that fertilizer on?

A. On land that needs it. I would not expect to grow a maximum crop of corn on thin land by using 200 pounds of fertilizer. But take good land that has a lot of nitrogen in it, and you can get good returns from 200 pounds of acid phosphate and steam bone mixed, half and half.

Q. What is a good three year rotation?

A. A popular one with us is corn, wheat and clover. In some sections of our State where wheat is not a sure crop we use corn, oats and clover.

MORE CORN FOR MISSOURI.

(S. M. Jordan, Farmers' Institute Director, Missouri State Board of Agriculture.)

S. M. Jordan.

In the discussion of this subject a number of things are necessary to be considered, as no one thing will produce a great crop. As a foundation, we will start with the statement that you cannot grow a bumper crop of fancy corn with scrub seed, in scrub soil and with scrub care.

As to the seed, there are perhaps 500,000 bushels of the million bushels planted each year in Missouri that will be found to be more or less questionable. Perhaps not one-fourth of the seed planted has had any intelligent care as to its breeding. Not one per cent. of the farmers of Missouri are making even any attempt at intelligent breeding of corn. If the same degree of attention were given it as farmers have been giving to the breeding of live stock, then Missouri would certainly produce more corn than she does. A breeding plat or seed plat on which some good ears are planted, and then undesirable stalks removed as the crop is growing, would be a great factor in increasing the Missouri corn yield. I am inclined to the opinion that every man who grows corn should either have a breeding plat or depend on someone who has a breeding plat to supply him with seed corn.

Another factor in low yields is due to the fact that not 10 per cent. of the farmers do as well as they understand in the selection of their seed, even from the field. The truth of this statement can be demonstrated or proven in any audience of farmers by simply taking a vote on the question, as I have done in scores of cases. The very best way is to select the seed as soon as the corn is ripe, taking no ears except those found on good plants. The plant will tell more of a story as to the producing capacity of an ear than the ear itself can possibly tell. I do not believe any ear of corn, no matter how fancy it may be, can be a good producer unless it grew on a stalk having good vital organs. The root system and the blade system are the vital organs of the corn plant and correspond to the lung capacity and digestive capacity of an animal. If this seed is selected at this time from strong, shortjointed stalks having brace roots, and then immediately hung in a dry and well ventilated place that it may be perfectly dried out before freezing weather, there will be no difficulty in securing a stand so far as the seed is concerned. I believe the majority of farmers resort to positively the worst method of seed selection, and that is by getting corn out of our corn cribs a little before planting time. When this corn is cribbed in the fall there is yet considerable moisture in the cobs and the way that water would get out of the cob between that and the spring would be to freeze out. It should be evident to any man that the grains will have their vitality injured by being frozen on a wet cob. These grains may not be dead but will be crippled or their vitality seriously impaired. When an animal has had poor shelter and feed during a severe winter, the best results cannot be expected when spring time comes. These grains of corn may grow but their vitality is so poor that the product is generally either a nubbin or no ear at all. This matter of seed selection is another feature that must be given more care before Missouri will get the yields that we should have.

Another cause for low yields—and perhaps the greatest one of all, is that farmers are constantly growing corn on the same land, and while we farmers like to refer to our "great school of experience" we are often the very ones to absolutely fail to let experience guide us. There is no farmer today with a thimble full of brains but what is aware of the fact that we are corning our ground too much. His experience has told him so, but he fails to profit by it. Crop rotations must enter into his scheme of farming or else he will be farming wrong. I believe that the greatest reason more farmers do not practice crop rotations is because they do not know how. Just analyze that statement and if I am not talking the truth I wish you would tell me so. It is an easy matter to put a crop rotation on a chart, but an entirely different one to put it on a farm. It must fit the lay of the land, the fencing scheme, the crops best adapted to the soil, the feeding operations and the labor question, hence crop rotation becomes an individual problem that every farmer must solve for himself. He will find it to be one of the most difficult of solution and yet one of the best ones when he has that problem solved.

Another factor in low yields is insufficient preparation of the seed bed before planting. Another is that cultivation is both insufficient in quantity and quality—the method may be entirely wrong. Another is too much dry weather, which condition can be largely offset by the proper preparation of the seed bed and by right method of cultivation. Another is too much wet weather, and this last is the only one that is not largely within the control of the man doing the work. As evidence of this last statement, there is not a neighborhood in the State of Missouri in which some man cannot be found, who by practicing these things grew twice the average county yield, while just across the fence his neighbor is growing half the county yield—each with the same soil, the same sunshine and same showers, and with the same tools with which to do the work, and yet such a vast difference in results.

It seems to me that we often talk and waste breath in trying to induce the grown-ups to do better work. We are pretty well fixed in our ways and after the middle of life do not take on new notions very rapidly. We may agree as to their effectiveness, but when the time comes for doing the work we do it in the same old way. And so it is up to you and me to get the youngsters into it early, and when we do that we can most assuredly feel confident that they will get the answer. It has been the boys anyway that have won the actual battles of the world, and they will win this one if we do our part to guide them and direct them. The line of battle is clearly defined, and it is up to you and me to get busy.

THE SUCCESS OF A YOUNG CORN GROWER IN THE BOYS' ACRE YIELD CONTEST.

The acre yield contest in the Boys' Corn Growing Contest last year is certainly a step in the right direction. With the present knowledge of good corn, it is impossible to say which of two good ears is the best producer and which if given the same kind of care, and planted in the same kind of soil, will produce the most bushels of sound marketable corn per acre. Yet, that is the most important point about corn, and if we could recognize that quality of production in an ear we would have the biggest problem relating to corn improvement solved.

Recognizing this fact, the Weekly Star Farmer of St. Louis, undertook to conduct an acre yield contest among the boys enrolled in the Boys' Corn Growing Contest and offered $100 in four prizes to the boys who grew the most corn on an acre of ground. A ten-ear sample was taken from the acre and sent to the State show, together with affidavits concerning the yield of the acre. This corn was judged and twenty-five points placed on the sample and seventy-five on the yield.

Chester Matheny.

Chester Matheny of Miami won the first prize with a yield of 91 bushels and 15 pounds. Mr. Matheny, by the way, is a boy twenty years old who has been enrolled in the Boys' Corn Growing Contest ever since it was organized. He attends the Corn Show every year and the short course for boys during Farmer's Week and is one of the best young corn growers of the State. He is always among the winners whenever he enters a sample of corn. In addition to this prize this year he won the Boys' Corn Judging Contest and took away from the State Corn Show more than $85 in prizes. His success has been due to hard work, close observation and the application of the things he has learned by being in the Boys' Corn Growing Contest. Mr. Matheny tells how he grew this acre of corn as follows:

"The first thing I did was to put stable manure on the ground (which was clover sod) during the winter. In the spring I broke up the ground about five or six inches deep. After it was plowed, and when it was getting to be about planting time, I harrowed it. Then I found a few cut worms in the field and harrowed it again. I put off planting awhile on account of the cut worms; then the weather got bad. Finally, about the last of May, I planted it.

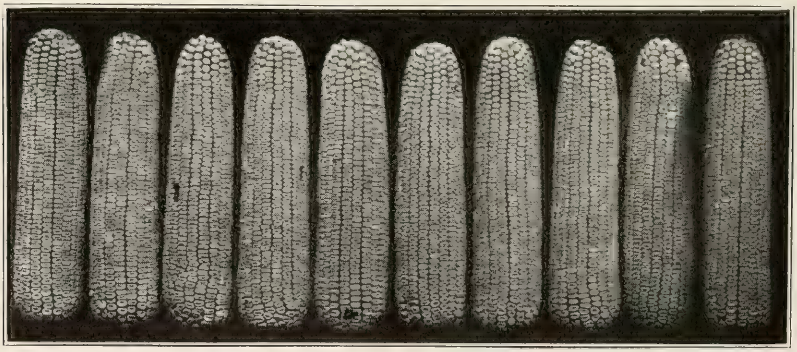
"I harrowed it three times just ahead of the planter. I marked the rows off with a two-horse planter. Then I followed these rows with a single shovel, making small furrows. I drilled the corn in these furrows.

"First of all, I knew a great deal depended upon the quality of seed, so I picked good seed. It was from some high-yielding rows of my father's 1909 yielding plot. I drilled it thicker than I wanted it to stand and after it was up so I could tell the good stalks from the bad, I pulled the bad ones out. Any time during the season I saw a bad stalk I pulled it out, no matter how thin the corn was in that particular place. I also kept the suckers pulled off.

"I plowed this corn carefully three times with a four-shovel riding cultivator, and hoed it once. After it was laid by, I fixed up a corn planter wheel, putting spikes in one side, and dragged this between the rows with one horse. Of course, this was not as good as a plowing, but is a good way when the corn is too large to plow.

"Before I could use this drag a second time, a storm came and bent some of the stalks over between the rows, so as to prevent using it without damaging the corn.

"We had a storm about the time it was tasseling that broke off many of the best stalks. I estimated the number of stalks broken off, and think I would have made about 110 bushels on this acre if it had not been for the storm. At harvesting time I measured off one acre, and gathered the corn and weighed it. It weighed out 91 bushels and 15 pounds."



Grand Champion Ten Ears, Missouri State Corn Show, January, 1911. *Champion Ten Ears Yellow Corn, National Corn Exposition, Columbus, Ohio, February,* 1911.

Missouri Home Makers' Conference.

(Proceedings of Fourth Annual Meeting Held Under Auspices State Board of Agriculture in the Agricultural College, Columbia, January 10, 11, 12 and 13, 1911.)

MINUTES OF PROCEEDINGS.

The Missouri Home Makers' Conference met on January 10, with a large number in attendance, which number increased as the meeting progressed.

The president, Mrs. N. H. Gentry, of Sedalia, called the Conference to order and declared it open for business.

In absence of the secretary, Mrs. Selvidge, Miss Pearl Mitchell of Rocheport was elected secretary pro tem.

Miss Mitchell.

The program was then begun and contained papers which discussed care of infants, care and improvement in the home, farm management, management of children, what the State is doing for her women, the problems of the rural school, the planning of a house, adulteration of textiles, pure foods, butter making, bread making, etc.

A strong appeal was made by Mrs. Greene for careful preparation of infant food as a prevention of mortality. It was recommended that young women should take a course in scientific care of babies along with other studies which fit them for life. That co-operation was needed in demanding clean milk depots, and elimination of the house fly. Argument was used by Mrs. Viles against elaborate wardrobes for the baby, plain, dainty, washable garments being recommended.

Mr. W. C. Hutchison of Jamesport, in the absence of his wife, read a paper on ''Curing of Hams.'' Much interest was evinced in this subject by questions from the audience.

The discussion of ''Butter Making,'' by Miss Kinney, developed a great variety of theories and methods and an amazing number of model churns.

The address of Prof. Kern, superintendent of rural schools of Winnebago county, Illinois, on "The Improvement and Advancement of Missouri Rural Schools," met with hearty sympathy. His idea of bringing domestic science and agricultural training into the country school is one sure to result in the broadening and development of the rural dweller.

The paper on "Home Care of the Sick" gave so many practical ideas that a motion followed requesting Miss Batson, superintendent of nurses at Parker Memorial Hospital, to give an illustration of the proper way to give a bath, make a bed and change the patient's clothing at next year's meeting.

Dr. W. P. Cutler, State Food and Drug Commissioner, in his address made a strong appeal to the housekeeper to test, as far as possible, the foods used, and to avoid all cheap and doubtful food stuffs.

"What Michigan is Doing for Her Women," by Miss Jennie Buell, Ann Arbor, and "What Missouri is Doing for Her Women," by Mrs. F. B. Mumford, were inspiring and instructive, showing the progress by this sex in these states.

Miss Bailey showed much good work done in "Local Organization and Enthusiastic Plans for Future Work."

Mrs. Chapin, in her talk on "The Relation of Home to the Rural School," spoke from the standpoint of teacher, combined with the experience of a visitor to the school and mother of pupils.

Mr. R. H. Emberson, Professor of Rural Education, dwelt on the advantage of having agriculture taught to girls as well as boys, and emphasized the value of Home Economics in the rural schools. He stated that thirteen schools were now successfully teaching it in their course.

"Some of the Problems of the Rural School," as given by Mrs. Marie T. Harvey, were a revelation to the casual observer—and most welcome and auspicious. Following this was an address by President Kirk of the Kirksville Normal School, who gave details of a model school.

Mrs. Clay, superintendent of the Girls' Industrial School at Chillicothe, told of the work of that institution, its past results and future hope. She stated that during her administration not one girl had come to this institution direct from the farm. The downfall came after she had left the farm for the temptations and pitfalls of the city spread for ignorant feet.

On the morning of the 13th, the Conference went into executive session. The report of the treasurer showed a small balance on hand.

Motion to use this fund to supply a nurse to conduct a day nursery for children accompanying the mothers attending this Conference was enthusiastically carried.

Motion by Miss Kinney to adopt resolutions recommending Mrs. Richard P. Bland for appointment as Hostess of the Missouri State Fair for next year.

Mrs. Chapin offered a resolution thanking the hostesses of Columbia for their cordial hospitality and entertainment, and also the faculty of the Agricultural College and Missouri State Board of Agriculture for the assistance and courtesy extended to the Conference throughout its session.

The election of officers to serve during the year resulted in the following:

President	Miss Alice E. Kinney, Franklin
Vice-President	Mrs. W. C. Hutchison, Jamesport
Secretary	Miss Pearl Mitchell, Rocheport
Treasurer	Mrs. W. T. Flournoy, Marionville

EXECUTIVE BOARD.

Mrs. N. H. Gentry	Sedalia
Mrs. H. Clay Harvey	Kirksville
Mrs. F. B. Mumford	Columbia

Motion was carried to adjourn until January 10, 1912, and the session of the Missouri Home Makers' Conference was declared at an end.

J. PEARLE MITCHELL,
Secretary.

ADDRESS BY PRESIDENT OF MISSOURI HOME MAKERS' CONFERENCE.

(Mrs. N. H. Gentry, Sedalia, Missouri.)

Mrs. Gentry.

We are just entering our fourth year in Home Economics, and our work is acknowledged by all a success. A hearty welcome is extended to all—the faces we have met here for the past years look home-like and pleasant. The new ones show our work is growing, and they, too, are interested. We are making friends we shall never forget; let us try and keep them. We are learning truths that will stay with us always. Let us be as one person, each knowing all each other knows—each being interested in the vital things of life—each one striving to be better wives, mothers, friends and home makers.

We are pleased to see so many, but what a vast army of farmers' wives not here! They have not yet learned the possibility of dropping everything and coming. I believe in a very few years this will be different. All are coming to realize more and more, in order to do things we must see and understand how others do the same things. In order to be good housewives and home makers, good mothers and daughters, we must form pleasant relationships with these very people. Our meeting we have here each year sheds knowledge, light and happiness over a whole year, and is of more value to us and our families than a whole year of drudgery would be. Then let us up and be doing, come each one, and, if possible, bring a neighbor or friend and get the benefit and pleasure prepared for us by our great University and our unexcelled State.

ADDRESS OF WELCOME.

(Miss Louise Stanley, in Charge of Home Economics, University of Missouri.)

This morning you were welcomed here by a member of the Commercial Club of Columbia, by the president of the University and the dean of our College of Agriculture. This afternoon I wish to welcome you in the name of the Home Economics Department of the University. We are glad to have you with us, and promise to do all that we can to make your stay here both enjoyable and profitable. As to the Home Makers' Conference, we want you to feel that it is your Conference, not ours. We are here to help you, but you, too, must help us, and by helping each other we will both be benefited. We want to come into closer touch with the women throughout the State. We want to know your problems, and we want to know your problems from your point of view. We can only know these by your coming here and putting these before us and by entering into the discussions. This year we wish particularly to have much open discussion, so that another year we may know more what you want and need.

We are especially glad this year to see so many from away. Each year we want more of you to come and to come from all sections of the State, and we want those of you who are here to become so saturated with enthusiasm for the work that you will go home and organize local home makers' clubs to keep alive all during the year the spirit of this meeting.

It may not be amiss here to tell something of what Home Economics in the University stands for. Home Economics is to home making what the present day agriculture—and by present day agriculture I mean the agriculture now taught in our agricultural colleges—is to the old time agriculture. When the first impetus was given to the application of scientific and economic method to farming, many objections were raised, but now the scientific method has won out and our agricultural colleges are pushed to the limit in order to accommodate all those who come to them. What has brought about this change? The scientific farmer has been tried and not found wanting. When we realize how much this farmer has increased the yield of corn to the acre, how he has raised a cow who can give 52 quarts a day, and who has saved millions of dollars to the State of Missouri alone by application of serum treatment in hog cholera, we do not have to seek further for an answer.

Sewing Laboratory.

Home Economics is now where agriculture was twenty years ago. As we were then loath to acknowledge that the agricultural methods of our fathers could be improved upon, now we are even more loath to suggest that the homes our mothers made for us could be in any way improved. Yet we are commencing to wake up to the fact that they may be, and particularly is this realized by those who are having to work under the conditions imposed by these homes. When arranging the program for this Conference I asked one woman to speak on the conveniences of the farm home. She said she could speak better on the inconveniences, as they were more general. Yet there are still those who do not think it worth while to give their girls, while in college, training particularly adapted for application in the life of the home. Why is there still this feeling that the teaching of Home Economics is not worth while? In analyzing the situation, it has seemed to me to exist chiefly with those persons who saw in Home Economics the teaching of cooking. Women pride themselves as much on the accomplishment of cooking as upon any other art. They have learned it by experience—not at school. Why should their daughters? So did their fathers till the soil, and they tilled on and on as their fathers had done, until as a result much of the soil in the country which was first settled is worthless. It can still be dug into in the same way, but it yet no longer yields crops. It must be handed over to the chemist, and he must tell how it is to be enriched so as to yield more crops. So long as Home Economics is simply evolving palatable dishes, there is little excuse for a university course in it, but when it means that this dish shall contain the most nourishment and the nutritive constituents are selected to fill some definite need, when the food is so prepared as to make it most easily available to the body, when we bring scientific principles to our aid in the study of any of the home problems—then Home Economics will become worth while. When the old style of agriculture failed it was brought to the front

Textile Laboratory.

again by the application of science, and, as in any industry when we commence the application of science, that industry must be prepared for by our colleges. It can no longer be taught by the apprentice system. We must either recognize Home Economics in our college course or else put the home on a static basis. If we are to dignify home making as a profession and as a profession to which we want brought all that is worth while from the sciences, then our girls must have some training for this profession.

If our girls are to have this training, most of them must get it in the high schools, many even in the rural district school. We should make a stand to have it taught there, and also in our girls' colleges, where so much attention is paid to music and art. Is it not also worth while that along with these accomplishments she should be taught some of these principles which will apply later in home making—not just cooking and just sewing, but the principles underlying these and other household duties? But you may argue that the training as given often times fails in after life. Your farmer fails under either of two conditions—either if he simply does without knowing why or if he is full of principles which he does not know how to apply. The same is true of your Home Economics girls. She must both know how to do and why she does.

There is as much science needed in cooking as there is in pharmacy. Sewing may be made an application of artistic principles as truly as picture painting. Household sanitation will do more in the conservation of the human race than hog cholera serum has done for pigs. Economically about 80 per cent. of the world's income is spent by women. Should they not be taught to spend it wisely? Is not this as important to our general idea of conservation as the increase of our crop of corn? But you may say a woman gets some of this by experience. Let me quote you a few words from an article written by a graduate of one of our women's eastern colleges: "But I resent bitterly the fact that during the eight principal years of my education when I had, if anything, too much leisure, no responsibility, a receptive mind, an unimpaired nervous system and a great adaptability, I was not at least in the last four years, in connection with other technical information—none of which I have ever happened to use except as everything one has read probably affects one's character—constantly receiving some training that would have saved me hours and weeks and what will probably amount to years of painful and in every sense expensive experiment."

But what is to be the part of the University Department of Home Economics? First of all, its purpose is the training in home making of those girls who reach us without having had such training elsewhere, and, under our present educational systems, they are many. Second, we have as an important purpose the training of teachers in this subject who are to go out to teach the youth of our State. We lay particular stress on this training and the scientific requirements which should underly such training. You would not consider a young man with no other preparation than the practical experience on the farm prepared to teach agriculture in your schools, yet practical home training is frequently considered a short cut to the preparation for teaching Home Economics. Third, it must serve as an experiment station, as the place where scientific investigations of household problems can be carried out, labor saving devices tried and the literature of pure science culled over to determine what can be adapted to our uses. We are to stand as the connecting link between the scientific world and the home. Through such meetings as these and through the teachers we send out to the homes the knowledge gained here.

Food Laboratory.

At present we have in our department over 150 girls, and were obliged to turn others away for lack of room. These will fall into three groups: (1) A. B. girls who elect our work; (2) those working for a B. S. in agriculture who may be required to take a certain amount of our work and may elect more; (3) those who expect to teach and combine our work with work in education.

In conclusion, let me invite you to inspect our laboratories, which are at present very crowded, but next year we hope to be able to show you better and larger quarters.

WHAT CAN THE WOMEN OF MISSOURI DO TO REDUCE INFANT MORTALITY.

(Mrs. C. W. Greene, Columbia, Mo.)

When the average woman reads such a title as the one that announces my paper, she thinks of slums and tenement houses, and feels that it is very unfortunate that babies must be born and die in such places, and then dismisses it from her mind and does not realize that she has any responsibility in the matter or can do anything to prevent the slaughter of infants that is going on all over the United States. There is no way of telling for the whole United States just what the death rate of infants is in proportion to the number of children born, for the reason that no universal record is kept either of the births or of the deaths. When the present census was made, the fact was revealed that in only seventeen states of our Union is there any attempt at registration of births and deaths. In many of these states the records were so imperfectly and carelessly kept that they had no scientific value. Why is this? People have for long years recognized the value and desirabilty of registering cattle, horses, hogs, chickens and kittens—then why not men? Here is what the Secretary of the State Board of Health of Kansas has to say on the matter:

"Kansas, poor old Kansas, bleeding Kansas, bleeding money, wheat and corn at every pore. A land of smiling sunshine, of winding streams, where you have but to tickle the soil to make it laugh a harvest. A land dotted with school houses and growing towns and villages, a land of pigs given to adipose, of sleek cattle, of strong horses, of handsome women, of bouncing babies, of homely rugged men, a land where no one dies, except through accident or overeating. Poor bleeding Kansas cannot afford to pay twenty-five cents to register those bouncing babies, and while for years they have duly registered their fine pigs, their cows and horses, at an expense of from fifty cents to ten dollars each, they deny their future citizens, the potential fathers and mothers of this great republic, the right of registration, the establishment of legal birthright for the pitiful sum of twenty-five cents."

In spite of its up-to-dateness in other matters, our own country has been slow in realizing that the babies of this generation are to become the material out of which citizens of the next generation are made, and that one of their rights as such is a record of their births. Every great nation, except the United States, keeps such records, even such conservative countries as Chili, Finland and Tasmania are ahead of us in the records kept of their citizens. With the imperfect records at their command, the Census Bureau has approximated that the death of infants under one year of age for the year of 1909 in the registration area was one-fifth the total deaths in those regions. One-fourth of all the deaths were those of children under five years of age—139,443 infants under one year, and two hundred thousand of children under five years, one-fifth of a million of child lives. The Spanish-American war cost us only six thousand men in deaths from all causes, and think of the public demonstration of our grief as a nation over their loss. It was a great loss, and our nation should recognize it and spend endless dollars on peace congresses and arbitration boards to do away with such dreadful sacrifies. But what about that two hundred thousand of babies, thirty-three times as many lives, that are dying every year?

Eighty-two thousand deaths resulted from tuberculosis last year. In our own little village of Columbia we furnish a victim every three weeks, for it is not in the large towns alone that this slaughter goes on. We cannot lay this crime to slums and tenements and negro population.

The large cities are doing much to reduce the number of infant deaths by the establishment of milk depots, where certified milk and medical advice are furnished free of charge to those who need it, either by private or municipal gift. There are three hundred such milk depots in the United States. Chicago alone has twenty-eight, yet Chicago's per cent. of the infant mortality is twenty-seven per cent. of the total deaths. Just across the Bay in Michigan City, a small village of Indiana, it is twenty-four per cent. of the deaths. In large cities, boards of health and philanthropic societies are doing much to legislate and educate in a way that leads directly to decrease of the death rate among all classes, and for infants in particular, good sanitation, pure water, free dispensaries of milk and medicine have been the salvation of the city babe.

The infant in the small town or the country does not have these privileges. He has, however, some other natural advantages. He is born of a heartier stock, his mother has better food, he is usually breast-fed, and that fact alone gives him 50 per cent. better chance for his life than the bottle-fed baby. He has better air, he gets more attention, more loving and romping because his mother works at home, while the city mother often goes away from home to work. So with these advantages and no sanitation or clean water or certified milk, the average country or village infant has a better chance for life than the child living in the city.

The child who helps most to swell this list of dead is the unfortunate foundling or institution infant. A committee appointed under the Sage Foundation to investigate conditions in certain of these institutions in the east, found that in some of them the death rate of infants of one year and under was 75 per cent. of those entered, and that 40 per cent. was the average of the 30 institutions studied.

Until complete and accurate registration of all births and all deaths are made, we cannot hope to help many of these cases, but when we do have these two lists, how easy it will be for the statistician to point out the plague spots in every state, town and community, and when these are made public, what a stirring around will result. Who would care to live in a town that had 30 per cent. infant mortality, when he could live where it was 15 per cent.? Doctor Fisher of Yale has investigated the causes of death of the infants who died in 1908, and finds that 55 per cent. of these deaths were unnecessary. The little fellows were brought into this world and then not given a fair chance—not even an opportunity to fight for their lives. One hundred thousand useless deaths in one year, 100,000 homes heartbroken uselessly! The cost of the average infant burial is ten dollars. That means one million dollars spent for burial expenses that might have been spent making babies laugh and gurgle and grow strong. Most mothers know Dr. Holt and feel he is a personal friend. Here is his opinion given in a recent address in the east:

''Forty per cent. of infant mortality has been adjudged to be preventable. As a general average there are 28 cases of sickness for each death. The amount of preventable sickness is thus seen to be enormous. Of infantile deaths 25.9 per cent. are due to tuberculosis, acute respiratory diseases, as influenza; contagious diseases, as whooping cough, measles and diphtheria. These are all capable of reduction through proper housing, isolation and medical treatment. Fifty-two and five-tenths per cent. are due to gastro-intestinal diseases. This is capable of great reduction through proper care and feeding.''

How much better to have had that $1,000,000 plus the $5,600,000 doctor bills, invested each year in the education of parents on the care of these babies. We would still have those 100,000 babies left as a national asset, and a year's training for the parents that would mean untold health and happiness for the generations to come.

To come at once to the root of this problem we must acknowledge that in the end it is the parents who are responsible for infant death. National legislation, State law and civic council can, and have done much along the line of sanitation, housing, control of contagious disease and water supply, free hospitals, clinics and dispensaries, but that does not reach the heart of the matter. The truth is that nothing can save those babies but intelligent, educated mothers. Fifty-two and one-half per cent. of these deaths were due to digestive diseases. Physicians called them "filth disease." That means in most cases unclean food, improper food, or ignorance in adjusting food to the child's need—ignorance and neglect—and this must be laid at the mother's door. She ought to furnish that babe his natural food. Failing that, she ought to know how to give him an artificial food that would meet his needs and give him a fair chance in life. How many of us could do it? How many of us would take the scientific care necessary to cleanse the bottles perfectly, weigh the food accurately, study the baby and know how to adjust his food to meet his requirements. Fortunately many women do, and the result is fine, strong bottle-fed babies. But we need more such women.

But you say, surely you will not place all this blame on the mother. She has lived between the Scylla and Charybdis of too much work and exhausted nervous energy for years. She would lay down her life at any time for her baby, she has worn herself to a physical and mental wreck in caring for the baby, and yet it died. The seat of the trouble is farther back. The grandmothers and the great-grandmothers must share the blame. Men tell us that we are conservative, and that it is good for the race that we should be conservative. This conservatism has kept us at home, has made us content with the ways that mother and grandmother had. We have not realized that conditions have changed, and so have not accommodated ourselves to our new environment. We have to meet conditions of hygiene, sanitation, bacteriology and sociology that our grandmothers did not dream of, but we have not been prepared to meet these changes. Our lack of preparation has been hard on all the family but it falls hardest on the baby, because he is least able to protect himself.

For example, the strenuous lives led by many women of today has resulted in inability on the part of the mother to nurse her own baby. That one item decreases the baby's chances for life 50 per cent. Now while our social and industrial conditions have robbed the mother of the power to nourish her own offspring, it has not trained her to be able to prepare a substitute for the milk that she should normally produce, nor has it furnished as yet, any means by which she can learn how to prepare such a substitute. The ignorance of women on such subjects is tragic. The sight of a clinical thermometer puts the average woman in a nervous chill, when she should recognize it as a never failing friend.

It should not be a cause for useless suffering to her, but just what it is, a measure of the body temperature.

The usual recourse is to some friend who has had similar experience, or to a physician. A study of the curricula of medical schools in this country will show how meager is the attention given to this question of infant care and feeding. In so great a medical school as Johns Hopkins, there is no required course in infant feeding, and it is possible in this school for a man to graduate and have no particular training in pediatrics, or infants' diseases. That is another story and since we are at present entirely dependent upon our physicians for any and all help that we may receive, it may be well for us not to criticize the physician, though we recognize his lack of training.

But to go back to our topic of conservatism in women, Dr. H. L. Burrell, president of the American Medical Association, says:

''It is difficult to change the habits of parents, but the children can be educated into acquiring habits that will maintain a better standard of health and living.''

Dr. Gulick, president of the National Playground Association, and a man who has thought and studied much on questions of hygiene, once said to me that he considered it useless to try to train women into doing things in a new way—that the average woman cares for her baby and dresses it just as her mother did. He thinks we may be able to educate *girls* into new ways of doing things, but not *women.* How many girls trained in home economics in our universities will in time ''keep house just as mother did.''

Personally I do not agree with these gentlemen, for while I recognize that there is some truth in what they say, I am very optimistic as to what women will do if they are given a chance. The world is so dreadfully inconsistent in its treatment and its demands on women. If we wish a man to be an expert in soils, we send him to a college to study soils, and put him in communication with the National Bureau of Soils at Washington. Or, if it is horticulture, or dairying, or engineering, we do the same thing. If we have a sheep, horse or a cow of specially fine pedigree, we put it in the care of a man trained for that one particular thing. But how is it with our babies? We put them into the hands of the young woman who happens to be their mother, regardless of what her experience or training may be. What opportunity has the average young woman had to make herself equal to the great task of taking care of this most difficult of all young animals to rear? He is the most difficult to bring to his fullest physical and mental development, because he is the top-most bough of the evolutionary tree. I have not been able to find a single college or institution of any kind that gives courses of study designed to train women for this task. Many courses are given in our universities that will give the foundation principles on which intelligent motherhood must rest, but none are given for preparation for motherhood alone. The world has not yet reached the educational development where it is ready for such courses. Look at the tremendous publicity that was occasioned by the newspapers when our own home economics department attempted to have a class of girls see a baby bathed by a trained nurse. It ought to be as natural for a woman to go to an institution of learning to fit herself for her life work of home-making and motherhood as it is for a man to study for law or the ministry. When we have realized that to make intelligent mothers who can bring into the world strong healthy babies and rear them to equally robust and efficient adults, we must educate women as well as girls, then and then only, shall be cut down our per cent. of infant mortality. Women must have thorough courses in the scientific subjects necessary for a grasp of the *principles* involved in intelligent motherhood, and not a few didactic lectures or a dictated formula for modified milk. You would as well give an untrained seamstress one pattern and tell her to make all the family clothing by that one pattern. The results would, no doubt, be equally felicitous in both cases.

I once saw a mother feeding a young baby uncooked banana. When I questioned her as to why she did it she replied that it was soft and the baby liked it. An irreverent youth who heard the conversation, remarked that tomato catsup was soft, and the baby might learn to like it. It had not occurred to that woman that softness and what the baby likes are possibly not good standards for the selection of infant food. She was an intelligent woman, and had she been taught anything about digestive enzymes and the development of digestive glands, how different her selection of food would have been.

I knew a college professor with several learned letters attached to his name, who was told once when the baby was sick and he was left in charge, that the baby needed a laxative. When asked later if he had given the laxative he said, "Yes, I gave him ten drops of paregoric." Had that man had the necessary training for parenthood, he would have known that opium is the chief constituent of paregoric, and has exactly the opposite effect of laxative. Men need training for parenthood just as well as women.

How many women in making the dear little wardrobes for the coming prince, plan that wardrobe from physiological and hygienic principles. Does she ask "How shall I choose to design his clothes to best keep the temperature the same all over his body and the same temperature at all times?" Does she recognize that heat regulation apparatus of an infant is imperfect when he first enters this world, and must be taken into consideration in dressing him if his digestion is kept normal? Or, does she think more about the effect his clothes will have on the neighbors who should admire them, or which decoration will be the prettiest?

Let us look for a moment at the possible ways of helping to solve this whole problem of infant mortality. First of all we must help enforce the laws for the registration of births and deaths. Listen to what Dr. Cassy Wilbur, chief statistican of the Census Bureau, says to us in the Division of Vital Statistics of this Bureau. I believe that great improvement can be brought about in the registration of vital statistics and the consequent prevention of the diseases of infants and young children by the organized and co-operative action of the Women's Clubs. If every member of these clubs would take pains to ascertain that the births of her own children have been registered properly and if not, owing possibly to the absence of proper legislation or the failure to enforce such laws, make inquiry as to how such evils could be corrected, it would have a very direct effect in improving the administration of registration laws.

It is especially desirable at the present time that the women of Missouri should aid in the support and insist upon thorough enforcement of the present excellent registration law that has been in force in your State since February 1, 1910. Missouri has taken a long step in advance in the passage of such a law, and it is being executed very thoroughly by the State Registrar, Dr. Frank B. Hiller, Jefferson City, but it is always true that during the first years of the operation of a law many difficulties arise from the reluctance of some physicians to comply with its provisions. Hence a strong moral support in the community will help the registration officials to make it the success that it ought to be.

The next step must be through the milk depot, and Dr. W. C. Philips, Secretary of the New York Milk Commission, tells of its possibilities in these words:

"The milk depot is the means through which we may hope to solve this problem in the cities, the instrument through which medical, social, educational and philanthropic prevention effects their purpose and achieve success. It should be an educational center, a district branch for the dispensation of relief, a co-ordinating unit between nurses, physicians, clinics, dispensaries, hospitals and philanthropic institutions, which concern themselves with the welfare of the child. We should have classes for mothers in infant hygiene, periodical consultation under the direction of physicians for weighing and examining the babies, and follow-up work in the home by visiting nurses. If infant mortality is to be prevented and not cured, the home must be the crucial place of attack. Before birth the depot nurse should assume the responsibility of preparing mothers for successful delivery. After the baby is born she will continue to look after it and place at the mother's disposal every known means of bringing that baby into a strong and healthy childhood. In the last analysis, infant mortality is not to be solved by philanthropy or by institutions, or by medical profession, or by the State, but by intelligent motherhood. Some day the State or the nation will recognize this great problem of education and conservation, and will take upon itself the burden not carried by philanthropists and will arrange it so that every woman is educated for intelligent motherhood and every baby born may have his rights respected. Shall be given a chance for a clean, strong body, proper food and sanitary surroundings.''

The third step is the help we may give our municipalities in enforcing laws for sanitation, segregation in contagious diseases, and in providing pure water. These three points will include all the diseases that are specially fatal to infants, except the gastro intestinal diseases, and that is when the education of mothers is absolutely necessary. A milk depot can supply clean milk but it cannot keep it clean. It cannot keep infected flies off the nipple of the bottle as the baby nurses, or away from the baby's mouth as it sleeps. We mothers must do that. There is another long and most interesting story to tell of what we may do for the total elimination of that most active dispenser of disease germs, the house fly, but we cannot hear it now.

Home Makers' conferences will help much along the line of educating mothers; the papers that follow mine will prove my statement. Women's clubs will help. Extension lectures may be given to us by the university professors and our best physicians, if only we ask it. The United States Government has lantern slides that it will loan for this purpose. The Society for the Study and Prevention of Infant Mortality will supply free, most valuable and interesting literature, and then the last and best of all, why may we not hope for such a set of lectures to married women to help them in their profession of motherhood as is being given to the farmers here this week in their professions? Why not have good short courses given to us on Personal Hygiene, Embryology, Physiology of Infant Nutrition and dressing and care, Chemistry of food, Prevention of Disease, Home Sanitation, the study of infant diseases—and so on, the possibilities are endless. I can foresee them leading to longer courses, with scholarships such as the Corn Growers have, and we may yet see the Mothers of Missouri flocking here by the hundreds, bringing their babies with them. There are great possibilities here. So I would give you the answer to this question of prevention of infant mortality in one phrase to take home with you. Have it for your club motto, include it in the city charter, place it on our State shield—it would educate the mothers.

THE PROBLEM OF DRESSING THE INFANT.

(Mrs. Jonas Viles, Columbia, Mo.)

This paper contains nothing new or startling on the subject of the layette, nor do I profess to know it all, but I have had practical experience and have acquired thereby a few decided opinions as to what is and is not suitable to provide for an infant coming to a family in moderate circumstances. It is to such that this paper is addressed.

Every woman's magazine runs its baby department and answers questions of dress for anxious mothers month after month. At least once a year such magazines publish longer or shorter articles on the layette, usually illustrated, giving prices of boughten articles, materials, number of different things needed, hints as to making, etc. Every large store has its infant department where one will be shown every conceivable article a baby might, could, would, or should need at any price she can pay. There are several shops in different parts of the country which style themselves ''Baby Shops'' and carry nothing whatever but the clothing and other articles that infants and very young children require. These shops all issue illustrated catalogs to be had for the asking, but visit these stores and pore over the catalogs for ideas only—your baby's clothes should be made at home. Often some one will say ''The boughten articles are just as good, so why take time and strength, etc.'' They are not. I assure you that a dainty handmade garment such as you will want your little one to have has a price attached to it which is simply prohibitive, while a homemade layette composed of such garments is within the reach of all. The caps and perhaps the coats are the only exceptions to this rule. These, too, may be gotten up less expensively at home but require more skill in the making, and boughten articles may prove more satisfactory in the end.

In making the layette, keep two things in mind: First, let all work be done by hand as far as practicable (machine sewn seams are far stronger and a great saving of time); second, make nothing that will not "tub" easily and often. The current number of a woman's magazine has a profusely illustrated article on the making of a layette which to my mind is nothing short of criminal. An expectant mother has committed a crime if she has given hours of time, not to mention eyesight and nerve force, to the senseless elaboration of these little garments. A little baby, be he prince or pauper, is no respecter of his clothes, and I do not think a baby kimono is a legitimate field for beautiful embroidery, neither do I think a French flannel kimono wonderfully wrought on collar and cuffs and down both front edges with vines and tendrils, a suitable garment to put onto a baby. Ten to one it will have to go into the wash tub after the first wearing and it will never look so well again, even if a professional hand has the washing of it, and none other should touch it. In this class of unsuitable garments, with all those too elaborately embroidered to be of daily use, are included those made of unsuitable materials, such as muslin bootees over silk, lingerie coats with silk linings, or anything of any material that will not stand frequent "tubbing." Cut out everything that will not stand this test. Feather

Mrs. Viles and Children.

stitching and button holding are legitimate finishes, a flannel petticoat without these is an ugly sight and there are many little touches here and there that are charming, and do not render the garment thus adorned, too nice for everyday wear.

The list of necessary articles in a layette and the number of each is very short. It is as follows: three shirts, six bands, four dozen diapers, three pairs of knit bootees, three flannel skirts, six or eight cotton slips, four outing flannel nightgowns, an indefinite number of little jackets of flannel or worsted, little flannel blankets with crocheted borders or edges bound with wide wash ribbon, afghans, blankets, etc., without end. The cap and coat may or may not be provided beforehand. Have plenty of common bibs of strong material thickly padded and several handsome ones of lawn trimmed with lace and handwork. I have never had or felt the need of a pinning blanket or barrow coat, as it is also called. These are worn to protect the flannels, but with a properly adjusted diaper this danger is completely avoided. Many like long flannel wrappers, and there are times when one comes in quite handy. Be sure to make it with the so-called coat sleeves and fasten the front with buttons or snappers clear to the feet. If you must have ribbon ties let them be short ones right at the neck, and let all other bows be firmly sewn in place. Restless baby hands untie ribbons as fast as mother can tie them up, and baby mouths make short work of their freshness and beauty. This same hint as regards sleeves and fastenings, applies to the nightgowns and all jackets. Should you possess any of the latter fastened otherwise it is a good plan to put them on hindside before. Wrappers and jackets are worn for extra warmth, and kimono sleeves and flowing fronts do not fulfill this mission, while many flying ribbons are a nuisance plain and simple.

In addition to this list, the outfit for the first baby will contain one real dress, a white skirt to go with it and probably a special flannel skirt will be necessary also, as the length of this dress and skirt will be somewhat more than that of the regular slips and skirts. Let your desire for lace and elaborate hand embroidery run riot here, for this is probably the christening dress and will be worn for the first picture. It will do duty on the same occasions for number two and number three, and perhaps for another generation as well.

As the first size of little shirts will last only about three months while the second size will answer equally well from birth to six months or so, it is best to choose the latter, of silk and wool mixture, buttoned all the way down the front. These will cost, apiece, from 75 cents up—say 95 cents.

What is sold as all-wool flannel will cost about 60 cents a yard. There is, however, a flannel on the market at 75 cents a yard that absolutely will not shrink and does not grow yellow with age and much washing. Make the petticoats in the popular "Gertrude" style, which opens on the shoulder, about twenty-eight or thirty inches long. Feather stitch the same and buttonhole the top and bottom edges. Fasten with buttons and buttonholes. When buying the flannel allow an extra yard for the bands. These should be about six inches wide and torn across the goods; the edges should be left raw. I have given six as the number required, but there should be enough so that a fresh one can be adjusted as often as necessary.

Buy cotton birdseye for the diapers, making two dozen of the eighteen-inch width and two dozen of the twenty-two inch width. Cut the material about three inches longer than twice the width, which will allow for shrinking and yet leave a double square when folded; finish each end with a narrow hem. Old table linen is nice for inner diapers, made up double in about fourteen-inch squares.

Little socks or bootees of worsted should be plenty large. If the ribbon is run in high enough up on the leg and properly tied, the infant cannot kick them off. Some advocate woolen stockings that can be pinned to the diapers, thus covering the whole leg; the only objection is, that they become wet or soiled almost as frequently as the diapers.

In many lists, night slips, day slips and dresses are all set down as necessary. Only one of these seems necessary, day slips, which are more elaborate than those called night slips, yet perhaps not quite grand enough to be called dresses. Plain white goods or crossed bar in small designs, costing from 25 cents to 37½ cents a yard, may be used, and a variety of styles of making are given to select from. Either of the goods makes up prettily with tucks to form a yoke, a bit of insertion or hand embroidery in the center front. The cross bar is lovely made with a bias seam down the center front stayed with a piece of insertion let in from the neck to hem, and a straightway seam down the back. This design has neither gathers nor tucks and is especially dainty and becoming. Bishop sleeves are prettiest for the slips. Make all wrists, armholes and necks amply large; six and a half inches is none too large for a finished wrist, and ten and a half inches for the neck. Nothing is so pretty with which to finish wrists and neck as narrow French Val. Thirty to thirty-two inches is quite long enough for these slips.

Instead of the night slips which are of cotton and designed to wear over the flannel petticoat, I use flannel nightgowns of outing cloth without the petticoat. This comes at 12½ to 15 cents a yard. Have these nightgowns very long and very plain; the neck and sleeves may be faced with wash ribbons. Have the gowns open at the back with buttons and button-holes and make the placket holes of goodly length.

Caps may be of silk or muslin with an extra silk lining in summer or a wadded one in winter, or a knit cap of silk or wool may be worn. Bear in mind that the baby's head will grow rapidly and probably will be larger at first than you think; as the cap is not required at once, for this reason I am advising waiting until later to make or purchase. The same is true of the coat. Until the infant gets lively a warm shawl or sleeping bag of eider down flannel is quite enough to wrap him in when going out for the air. For the coat choose a narrow wale Bedford cord, cashmere or other soft white woolen cloth, and make it large and roomy, with ridiculously long sleeves. Line it with white sateen, blind stitched in loosely, as in washing the outside will shrink far more than the inside, making alterations necessary. A yoke pattern may be selected, but capes, long or short, single or in sets, and turn over collars are a nuisance. If you think you want one or more capes, take my advice and finish it separately from the coat, binding the neck with ribbon and leaving ends long enough to tie. Finish the edge of the cape with heavy lace or gathered ribbon. Protect the front of the cape with a bib of more or less elegance. A goodly supply of bibs of heavy material with scalloped edges which will cost from 10 cents apiece upward will be found handy for months. Keep the elaborate bibs for great occasions. There will be more need of them the second year than the first.

The proper way to put on the clothes is as follows. You should be seated in a chair without arms of such a heighth that your legs are at right angles to your body when your feet rest firmly on the floor. All that you will require should be conveniently placed at your right hand; the infant should lie in your lap with his head to the left. First adjust the band; then the shirt, remembering that arms bend up and back, not down and back. Adjust the diapers, pinning them to the shirt in front and around each leg just above the knee. Do not fold diapers too small nor put on too tightly, but a properly adjusted pair of diapers will prevent many accidents to the other clothes. Next put on the socks. The flannel skirt and slip, or dress, should go on over the feet. Slip your right hand up through the garments, grasp the infant firmly by the feet and work the garments to the proper position with the left hand. Turn the infant over on his face, pin the diaper to the shirt in the back and button the dress.

SOME RECENT ADVANCES IN INFANT FEEDING.

(By Miss Louise Stanley, in Charge Home Economics, University of Missouri.)

No one other factor is so important in the prevention of infant mortality as that of infant feeding. This fact was brought out most forcibly to the writer when first spending an extended period of time at a Babies' Hospital. When the daily rounds were made it was noted that the prescriptions were mainly in form of changes in the food and little medicine was given. Of course medicines were used as stimulants if needed, but the use of these was nominal in comparison with the greater use of dietetic changes.

This brings dietetic, and particularly dietetics of infants, under the control of the physician, and it should be insisted upon that all our graduating physicians at least have an opportunity to learn something of this most important science. But not only is dietetics a factor in the curing of disease but to a still greater extent is it a factor in the prevention of many of the most serious difficulties of infancy.

The artificial feeding of infants is as yet in an experimental stage. It is a hopeful sign, however, that it is experimental, for when we realize that we do not know all about a subject then we commence to make advances. It is the mother who must feed the child and its needful that she should know some of the lines of advance in the experimental work on infant feeding.

Miss Stanley and Some of the Little Folks at a Babies' Hospital.

First of all let us emphasize the value of natural feeding. As has been brought out by the previous speaker, the child who is naturally nourished has very much better chance for life. Why is this? First of all, as will be shown in the latter part of this paper, we find the nutritive constituents in human milk both qualitatively and quantitatively adapted to the needs of the child. If for any reason this is not true the mother can in most cases, by careful adjustment of her habits and food, so change the composition of the milk so as to make it more nearly what the child needs. Secondly, the milk is delivered to the child at the proper temperature and, if the mother is healthy, sterile. The advantage of this, over cow's milk, is obvious. The growing tendency of mothers not to nurse their infants is criminal. In some cases there are definite reasons why this cannot be, but in others they are not more definite than those expressed by two women in entirely different walks of life. One, a negro woman, expressed by saying, “Talbot (her six months old boy) would haf 'ter shift fer hissef when she left the hospittle.” She was going to wean him and leave him at home (probably tied in bed), alone with a bottle of milk from eight to six o'clock every day, because by so doing she could earn more money. Another, a white woman, came with the request that the baby be put on milk formula, as when she nursed him she was obliged to be there every two or three hours, and that was not always convenient. Let us first of all, then, teach our women the importance of breast feeding, and give them such ideals that they will nourish their own infants whenever possible and not cast them aside for some petty reason.

But suppose the child must be artificially fed, what are the principles which must guide us? Before tracing out the development of the principles of infant feeding, let us emphasize one point—that is, babies cannot be fed by rule. We are dealing with individuals. We can be guided by certain definite principles but these principles must be adapted to the individual cases.

Let us trace now the development of some of these principles. One of the first is the basis of what is known as the per centage method of feeding. Comparing the composition of human milk with that of cows' milk, which is usually substituted for it, we have:

HUMAN MILK.		COW'S MILK.	
Protein	1.50	Protein	3.50
(Casein .50)		(Casein 2.90)	
(Whey-protein 1.00)		(Whey-protein .60)	
Fat	4.00	Fat	4.00
Sugar	7.00	Sugar	4.50
Salts	.10	Salts	.70
Water	87-88	Water	86-87

The differences here are obvious and the first advance in infant feeding had as its aim the modification of cow's milk to make it approximate as nearly as possible human milk. As the protein of cow's milk is too high the first step is dilution—usually with water, and as that makes the per centages of both the fat and sugar too low, these were then increased by the addition of cream and sugar.

This scheme had scarcely been fully adopted before it became evident that the per cent. of the the various food elements was not the only point to be considered, but there were qualitative differences which must be kept in mind. The question of the protein was the first stressed. The table shows clearly that a much greater proportion of the protein in human milk is in the form of albumen than in the cow's milk. This, combined with the fact that many infants suffering from troubles of indigestion passed huge masses or curds that might easily be taken for casein curd were they untested, and even on chemical analysis are difficult to distinguish from casein curds. This leads to the further dilution of the milk and the addition of more cream; and also the use of lime water and various cereal waters as diluents of the milk instead of water, as by means of these it was possible to separate the casein particles and a less dense curd would be formed.

Chemical test eventually came to show that these so-called casein curds were in the large part not casein but calcuim soaps. Casein curds, it is true, do sometimes appear in the stools of infants but are quite different in appearance from the more frequently appearing masses of calcium soap. The surest test for the mother, if the curds are at all soft and not tough, is to substitute a skim milk mixture for the cream mixture she has been feeding, and if the curds disappear she may be sure they were caused by the fat. She can then gradually increase the fat until the curds reappear. She will be safe if she keeps just below this limit.

The casein and fat being in disrepute, it is natural that great dependence should be put upon the sugar. This has tended to the use of increased amounts of sugar and especially in those infants that were suffering from any nutritional disturbances.

The effect of too much sugar in the diet has been more difficult to clear up because its results are not so easily demonstrated. If the cream is undigested it appears as casein curds in the stools, if fat is causing the trouble the large masses of calcium soap or smaller flecks of unsplit fat are easily distinguished. But where must we look for the sugar? Not in the stools, for the digestion of the sugars which appear in the diet of an infant is comparatively a simple process and it is usually absorbed almost completely, or else split by bacteria. But what happens after absorption? It was found by German investigators as early as 1907 that children ill with gastro-intestinal troubles were excreting sugar in the urine. Sometimes this sugar had been split—digested—and sometimes absorbed and excreted unchanged. Later German investigators have affirmed this conclusion and have found that these infants thrive very much more satisfactorily if fed on mixtures which contain a very low percentage of sugar, or perhaps for a while contain no sugar at all. Such a mixture is obtained by precipitating the casein from the milk by the addition of an acid and re-dissolving or suspending this casein in lime water or by adding such casein suspension to a buttermilk mixture in which the carbohydrate has been lowered by acid formation from sugar. What would suffice in most cases is to simply leave out for a time the sugar usually added to the feedings.

But the objection is raised that the child needs this food and is there any harm in the child excreting a small amount of the sugar it has taken in its food? Finklestein, a German investigator, lays great stress upon the sugar excretion as a danger signal. It is these children who go over so suddenly into the intoxication stage and sudden collapse. Anyone who has ever seen a child in this condition will never forget it.

It was the pleasure of the writer to work last summer at a babies' hospital. While there the urines of a number of infants were examined. All those children in stages of intoxication or suffering from any acute gastro-intestinal troubles were excreting sugar if sugar was present in the diet, and furthermore, some children who were apparently well were excreting sugar. These latter infants who continued under observation were suddenly taken with acute gastro-intestinal troubles and died. The fact of the number of infant deaths from gastro-intestinal diseases during the hot months, and practically during later months, is too well known to need emphasis. The difficulty has been supposed to be a bacteriological one, but when facts like those above are brought out and brought out under hospital conditions, where all possible care has been taken, it behooves us to stop and think a moment to see if possibly the excess of sugar is not at fault, in some cases at least.

As to the kind of sugar that should be added to the diet of an infant, logically it is lactose, but experimental evidence goes to show that lactose is absorbed no better, if as well as ordinary cane sugar, which is much less expensive.

In conclusion, we wish to emphasize the following points: In infants with weak digestion, contrary to our ideas based on the so-called per centage method of feeding, the fat and sugar are much more apt to cause trouble than the casein. Second, cane sugar can, with seeming advantage, be substituted for the much more expensive milk sugar.

Third, we wish to emphasize the fact that no baby can be expected to be benefited by a definite method of feeding because some other baby was. We must apply principles and note results. These results can only be gotten by a careful knowledge of the baby's daily gain in weight, and in cases where the gastro-intestinal disturbances is serious by a careful chemical examination of urine and stools. Only in this way can we tell what part of the food the child is using, and what part is causing the disturbance.

THE CURING OF HAM.

(Mrs. W. C. Hutchison, Jamesport, Mo.)

Mrs. Hutchison.

There is no other product of the farm to which the owner points with greater pride than his abundance of well-cured ham, one of the daily essentials for the table; and if it be well cured, then well cooked, we certainly have one of the most appetizing dishes that can be placed before us. Besides, this may not be limited to the farmer alone. Those of the city may enjoy equally with him by purchasing the slaughtered hogs, then using a good method of "sugar curing." Again, it is economy to those in the city and a profit to the farmer, should he place them on the market. It is always ready sale, and brings a much better price than the packers' meat or the ordinary salt ham. Should we decide to market our own "home made," "sugar cured" hams, there would be a very great demand for them. Each year we are compelled to refuse a number of would-be purchasers.

And to all interested in the "sugar cured" method, we give the following recipe:

To 1,000 pounds of meat—40 pounds common salt, 10 pounds Orleans sugar, 4 pounds black pepper, 3 pounds salt petre, ½ pound cayenne pepper.

Mix thoroughly, then rub on half of the mixture on the meat, let lay two weeks, then rub on the remainder, after which let lay four weeks, then hang and smoke. As soon as the animal heat is out of the meat, we apply the first half, carefully covering the skin and flesh side alike, and also well over the hock bone. The expense over salted meat is very small, and I think about equal to other methods of curing, and the amount of labor for first application is also very little more than salting, and for second application it requires the labor of one man about one hour, and for smaller quantities of meat, time and labor in proportion. Do not think the quantity of the preparation too small, for although it may look so to one, yet it is an abundance. As the mixture is put on the meat each ham is placed separately upon a platform, there to await the second application, when it is again replaced for the four weeks. Then we hang and smoke for four days from wood fire, not being partial to hickory wood. By this time the meat is firm and dry, and it is wrapped in newspapers, then placed in sacks made of denim, or other strong material, and hung in a cool, dark place. We have used this recipe for fifteen years, have never had a ham to spoil, and have never eaten better. In fact, a visit to our home by Dr. Edna Day and also Dean Waters is the occasion of this paper being given.

SOME PROBLEMS OF BUTTER MAKING IN THE HOME.

(Miss Alice Kinney, New Franklin, Mo.)

Miss Kinney.

Producers and consumers are both familiar with the unsavory reputation of the average country butter, and for that reason alone oleomargarine has been a most successful substitute, always free from off flavors and mottled conditions.

The problems of producing good butter are many, but where should we find conditions more favorable than on the farm—good pastures, plenty of pure water, an abundance of fresh air free from the over crowded conditions of poorly ventilated and unsanitary cow barns. Yet with all of this there still remains the necessary something to successfully take hold and produce a uniformly good quality of butter. Every novice feels that her failures are due to the lack of proper appliances, so with great interest we read, during our probation period, of a successful competitor in an eastern butter contest telling of her simple methods of setting and skimming the milk, dasher-churn and paddled-worked butter—all of which are contrary to our best instructions. The success came from the woman's keen judgment of just when to churn to have sweet butter, just how and when to paddle in order to free the butter of milk and yet not break the granules unnecessarily. The cream separator has become almost a necessity on the farm to reduce the labor of properly caring for quantities of milk, yet even with this wonderful machine bad butter is still marketed and sour cream delivered to the caterer—for the need of the proper woman behind it all. The lack of ice in many farm homes has made the work more arduous, yet a case has been cited when this has been overcome by daily churning, thus not allowing the cream to become too acid, also being able to market a good quality of butter. Again, this woman was equal to making her conditions.

Just how to stimulate the pride and knowledge of what really constitutes good butter among many of our farm women is the most difficult problem, especially as long as their products bring the same price over the counter as the untiring efforts of women who offer only a finished product.

With all of this there is plenty of good butter being produced, but we must realize that the greatest problem after all in the making of only good butter is not so much the proper facilities, but always the woman behind the butter.

THE SMALL FARM HOME.

(Mrs. A. J. Wilder, Rocky Ridge Farm, Mansfield, Mo.)

Mrs. Wilder.

There is a movement in the United States today, wide-spread and very far reaching in its consequences. People are seeking after a freer, healthier, happier life. They are tired of the noise and dirt, bad air and crowds of the cities, and are turning longing eyes toward the green slopes, wooded hills, pure running water and health-giving breezes of the country.

A great many of these people are discouraged by the amount of capital required to buy a farm, and hesitate at the thought of undertaking a new business. But there is no need to buy a large farm. A small farm will bring in a good living with less work and worry, and the business is not hard to learn.

In a settlement of small farms the social life can be much more pleasant than on large farms, where the distance to the nearest neighbor is so great. Fifteen or twenty families on five-acre farms will be near enough together to have pleasant social gatherings in the evenings. The women can have their embroidery clubs, their reading club, and even the children can have their little parties, without much trouble or loss of time. This could not be done if each family lived on a one-hundred or two-hundred acre farm. There is less hired help required on the small farm also, and this makes the work in the house lighter.

I am an advocate of the small farm, and I want to tell you how an ideal home can be made on and a good living made from five acres of land.

Whenever a woman's home making is spoken of, the man in the case is presupposed and the woman's home making is expected to consist in keeping the house clean and serving good meals on time, etc. In short, that all of her home making should be inside the house. It takes more than the inside of the house to make a pleasant home, and women are capable of making the whole home, outside and in, if necessary. She can do so to perfection on a five-acre farm by hiring some of the outside work done.

However, our ideal home should be made by a man and a woman together. First, I want to say that a five-acre farm is large enough for the support of a family. From $75 to $150 a month, besides a great part of the living can be made on that size farm, from poultry, or fruit, or a combination of poultry, fruit and dairy. This has been proved by actual experience so that the financial part of this small home is provided for.

Conditions have changed so much in the country within the last few years that we country women have no need to envy our sisters in the city. We women on the farm no longer expect to work as our grandmothers did.

With the high prices to be had for all kinds of timber and wood, we now do not have to burn wood to save the price of fuel, but can have our oil stove, which makes the work so much cooler in summer, so much lighter and cleaner. There need be no carrying in of wood and carrying out of ashes, with the attendant dirt, dust and disorder.

Our cream separator saves us hours formerly spent in setting and skimming milk and washing pans, besides saving the large amount of cream that was lost in the old way.

Then there is the gasoline engine for the farm. Bless it! Besides doing the work of a hired man outside, it can be made to do the pumping of the water, and the churning, turn the washing machine, and even run the sewing machine.

On many farms running water can be supplied in the house from springs by means of rams or air pumps, and I know of two places where water is piped into and through the house from springs farther up on the hills. This water is brought down by gravity alone, and the only expense is the piping. There are many such places in the Ozark hills waiting to be taken advantage of.

This, you see, supplies water works for the kitchen and bath room simply for the initial cost of putting in the pipes.

In one farm home I know, where there are no springs to pipe the water from, there is a deep well and a pump just outside the kitchen door. From this a pipe runs into a tank in the kitchen and from this tank there are two pipes. One runs into the cellar and the other underground to a tank in the barn yard, which is, of course, much lower than the one in the kitchen.

When water is wanted down cellar to keep the cream and butter cool, a cork is pulled from the cellar pipe by means of a little chain, and by simply pumping the pump outdoors, cold water runs into the vat in the cellar. The water already there rises and runs out at the overflow pipe, through the cellar and out at the cellar drain.

When the stock at the barn need watering, the cork is pulled from the other pipe, and the water flows from the tank in the kitchen into the tank in the yard. And always the tank in the kitchen is full of fresh, cold water, because this other water all runs through it. This is a simple, inexpensive contrivance for use on a place where there is no running water.

It used to be that the woman on a farm was isolated and behind the times. A weekly paper was what the farmer read, and he had to go to town to get that. All this is changed. Now the rural delivery brings us our daily papers, and we keep up on the news of the world as well or better than though we lived in the city.

The telephone gives us connection with the outside world at all times, and we know what is going on in our nearest town by many a pleasant chat with our friends there.

Circulating libraries, thanks to our State University, are scattered through the rural districts, and we are eagerly taking advantage of them.

The interurban trolley lines being built through our country will make it increasingly easy for us to run into town for an afternoon's shopping or any other pleasure. These trolley lines are and more will be operated by electricity, furnished by our swift-running streams, and in a few years our country homes will be lighted by this same electric power.

Yes, indeed, things have changed in the country, and we have the advantages of city life if we care to take them. Besides, we have what it is impossible for the woman in the city to have.

We have a whole five acres for our back yard and all outdoors for our conservatory, filled not only with beautiful flowers, but with grand old trees as well, with running water and beautiful birds, with sunshine and fesh air, and all wild, free, beautiful things.

The children, instead of playing with other children in some street or alley, can go make friends with the birds, on their nests in the bushes, as my little girl used to do, until the birds are so tame they will not fly at their approach. They can gather berries in the garden and nuts in the woods, and grow strong and healthy, with rosy cheeks and bright eyes.

This little farm home is a delightul place for friends to come for afternoon tea under the trees. There is room for a tennis court for the young people. There are skating parties in the winter, and the sewing and reading clubs of the nearby town, as well as the neighbor women, are always anxious for an invitation to hold their meetings there.

In conclusion, I must say if there are any country women who are wasting their time envying their sisters in the city, don't do it. Such an attitude is out of date. Wake up to your opportunities. Look your place over, and if you have not kept up with the modern improvements and conveniences in your home, bring yourself up to date. Then take the time saved from bringing water from the spring, setting the milk in the old way and churning by hand, to build yourself a better social life. If you don't take a daily paper, subscribe for one. They are not expensive and are well worth the price in the brightening they will give your mind and the pleasant evenings you can have reading and discussing the news of the world. Take advantage of the circulating library. Make your little farm home noted for its hospitality and the social times you have there. Keep up with the march of progress, for the time is coming when the cities will be the workshops of the world and abandoned to the workers, while the real cultured, social and intellectual life will be in the country.

INCONVENIENCES OF THE FARM HOME.

(Mrs. W. T. Flournoy, Marionville, Mo.)

An inconvenience is that which gives trouble, embarrassment or uneasiness, disadvantage—anything that disturbs quiet, impedes prosperity or increases the difficulty of action or success. You can see that the definition of the word gives me a very wide range; I can say nearly anything under that heading.

In the State of Missouri there are about 300,000 farm homes. Of this number 63,300, or 21.1 per cent., are rented. In more than half the counties in Missouri there has been a decline in the rural population averaging several per cent. in the past ten years, and this decline is not because of the lack of prosperity. Perhaps some of it may be due to the inconveniences of the farm home. The State Board of Agriculture says that the average advance in the price of Missouri farm land, taking the State as a whole, since 1900, is 77 per cent., which statement goes to prove that the retired or well-to-do farmer has made most of his money from the advance in the price of his real estate. But this increase in value has little to do with changing methods in the home as long as the farmer owns the land himself and lives on it.

If we confine ourselves to reading what the city papers have to say about the farmers, we will soon conclude that the average farmer has a modern home with electric light, water works, with all the household and farm machinery operated by simply pushing the button. That is the pipe dream of the city man, and not true to life at all.

Occasionally you meet a farmer who will tell you with much pride, and justly so, too, that he has a five or ten-room home down on the farm that has all the modern conveniences. We understand by that that he is equipped with hot and cold water, furnace, light, adequate sewerage, and so on. This farmer is not the average farmer. It's a pity he is so much in the minority. The chances are that the average farmer's wife has to carry the water in a pail from the barnyard well to do the family washing. The house she lives in its often built with not much thought in view, except keeping off the rain. It is not, as a rule, well ventilated or conveniently furnished. The family have few luxuries and not all of the necessities that they are entitled to. Mr. Dooley says that "the farm is where all the good things come from, and the city is where they go." Perhaps he is partly right. The average farm home has not kept pace in modern methods with the farm on the outside. We criticise the average farm woman for being a poor housekeeper, or for not being neat in her personal appearance, or that she doesn't know how to cook well, or that she doesn't cook as well as she knows, or many other things. The criticisms are unjust. She puts in so many hours a day at hard, physical labor that she is so tired she lacks interest in these other things, and so would you if so situated. The pity is that she has so few of the labor saving devices, such as running water, a gas or oil stove to take the place of the big coal or wood stove in the middle of the summer heat when the canning season is on. The fireless cooker has hardly been heard of in the average farmer's home. The bread mixer is unknown. The separator is just beginning to appear. The vacuum cleaner is well below the horizon yet. Ice is often a luxury to be indulged in only on state occasions. It certainly is inconvenient that Mrs. Average Farmer has so few of these labor saving articles in the home, but I am sure she does not want them very much. She is fairly well contented; she has always gotten along without many helps and can still do so. Very few farm women adopt new methods or machines after they reach middle age. It's sometimes inconvenient for her to get away from her home very often, so she fails to come in contact with other people often enough to keep her rubbed real bright. Frequently it is not easy for her to go several miles to church, so she gladly stays at home rather than make the extra effort to go. It is to the disadvantage of both Mr. and Mrs. Average Farmer that they don't do more reading. There are three things that prevent reading in the farmer's home, or in any home—the lack of time, of reading material and inclination. Every farm home should have a daily paper. It gives the family a glimpse of the outside world. Most farmers can afford to buy it, but very few can afford to do without it, yet many do not have it.

One of the greatest inconveniences of the farm home (and there are several) is bad roads. But Mr. Average Farmer doesn't want any better roads, for he always votes against any proposition for the betterment of the roads if it is likely to cost him anything. Another one of the greatest inconveniences affecting the farm home is the poor school which is the average in the country. The children from the farm go over these bad roads each day during the term to the district school house, where they bake their faces and freeze their heels while being taught, often by a young and inexperienced teacher, whose only qualification for being a good teacher is his or her cheapness. How much better and how much more convenient would be the central school with its comfortable building and its good teachers. But Mr. Average Farmer doesn't want any better schools for his children. He says so by persistently voting against any measure which might improve the schools. He loves his children, but he can't stand for any raise in his taxes.

Another, perhaps the greatest inconvenience affecting the farm home, is the mortgage or note held by the village money lender. It stoops the shoulders of the farmer, adds lines of care and worry to the face of his wife, and prematurely places burdens on the shoulders of the children. I do not know what per cent. of the farmers are in debt, but I do know that the village money lender is usually quite a prosperous individual, and he would be pretty apt to shut up shop if it wasn't for the farmers. However, I think the home of Mr. and Mrs. Average Farmer is about what they want. They are a pretty happy people. Occasionally, when the children begin to grow up the farmer yields to their entreaties and to the temptation of high prices and sells a part or all of his farm and moves to the nearby town or village where he says they can take things easier, have more conveniences, and where his wife will not have to work so hard as on the farm. The wife doesn't see much difference in her work. The children do get the advantage of a good school that someone else helped to build. If the questions of lights and water for the town is submitted to the voters, Mr. Farmer doesn't like to break his record, so he goes down to the polls and votes against it. We must admit after all that that it all depends on the viewpoint as to what are inconveniences and what are conveniences, what are necessities and what are luxuries.

PLANNING OF A HOUSE.

(Mrs. T. C. Wilson, Columbia, Mo.)

The subject assigned me, ''Planning a House,'' has always been one of great interest to me, and as merely planning costs very little, I have been able to indulge my fancy. But planning a house to suit someone else is a different thing.

No doubt each one here has her own individual view, but an exchange of thought on any subject broadens our vision and often good results follow. Naturally, before we build our new house, we must find a suitable location, and in this day of progress and development we are not governed, as were our forefathers, by the presence of a spring which would be on low land, but can build where we please, and as the prophet of old did command the water to come to us. For various reasons an elevation is preferable. This appeals to the more practical of us for the drainage, thereby making our home more sanitary and healthful. But from an artistic standpoint, let us build on the hill, where we can both see and be seen. In fact, we should try to be surrounded by the best that nature has provided for us and enjoy the beautiful world we live in. But 'tis a house beautiful I am to build, and there are so many different needs which may control the plans that I will only give in a general way a few main ideas.

The kitchen will be my first consideration, for as long as these liege lords of ours demand to be fed three times a day, and the physical and thereby the mental development of the future generation depends on us, this is the most important room in the house. Here, again, I shall take issue with our grandmothers, and again it's the change in the times. Instead of the huge room, where there was ample space for an over abundance of servants, we must think of probably one indifferent maid, but more often our own one pair of hands and perhaps weak back, and arrange accordingly. The kitchen should be small, but with a convenient arrangement of stove, table and sink, thereby saving steps. I would allow more space for my pantry than is customary. Have it large enough for a very generous arrangement of shelves (always enclosed), room for the refrigerator and an extra table, which will prevent a congestion which might occur in the small kitchen. We all love a bright, cheerful dining room, and it is practical, if possible, to build this room oblong—14 by 17 or 18 is a good size and symmetrical. For the ordinary family one living room is sufficient, if large enough. In this we must have our fireplace, which gives cheer to young and old alike, plenty of windows and light for both use and beauty.

In the arrangement of the bed rooms our first thought is that they are properly ventilated, with windows and doors as nearly opposite as possible. We should not forget in our plans to supply plenty of closets, the pride of the good housewife's heart. We must see that there is sufficient as well as suitable wall space for our furniture, and here is where an ingenious woman can so often do what neither your architect nor contractor will, by seeing where a door can be moved a little or a window heightened a few inches, thereby giving just the space needed.

I have dealt exclusively with the interior, but we must not forget that the outside must be beautiful, too, and if you decide on a style of architecture, conform strictly to that style. Don't put colonial pillars on your English bungalow, but have it conform to a given plan, rather than make of it a conglomerate mixture.

After you have planned and built your house in beautiful surroundings, and with all the conveniences and attractions of the modern house, there is still something lacking. But if the one who lives there has the love of God in her heart and the true home maker's spirit it will not only be a beautiful house, but a beautiful home.

HOUSE DECORATION.

(Miss Ella Victoria Dobbs, Instructor in Manual Training, University of Missouri.)

Miss Dobbs.

The title, House Decoration, suggests to the average person the pictures, hangings and pretty things which are added to a house for the sake of their beauty after the really necessary furnishings have been provided, but the subject as we are to consider it here means very much more. A really beautiful house is not secured merely by an accumulation of beautiful things, however fine each may be in itself, but comes rather through the harmony which pervades the whole whether the parts be very grand or extremely simple. It is quite easy to imagine a room in which each piece of furniture is good, perhaps fine, when considered alone and yet producing anything but a pleasing effect when taken together because of the lack of harmony in color, style and general proportions.

This harmony which is so essential can be gained only by considering the house as a whole and each room as a subordinate unit treated in its relation to the general idea which controls the whole house. This does not mean that there shall be a monotonous sameness from room to room, but that the passing from the hall to the living room shall not suddenly bring one into an entirely different atmosphere of color and proportions, and that the glimpse one gets of the dining room through an open door shall not clash with the nearer view.

The first essential in the treatment of the house as a whole is the underlying purpose of the homemaker, which is to express itself not only in the style, color and proportions of the various furnishings, but in the very atmosphere which pervades the whole house. A word or two regarding that purpose may not be out of place. The thought of home at once suggests rest and comfort, freedom from the cares and restraints of outside life, and the furnishings of the house should invite this freedom. Moreover, the house is also a workshop for some of the most important industries touching our daily life and should be planned with a view of carrying on those industries in the most efficient manner. One sometimes sees in a prominent place in the house a portrait of the mistress designed to show her at her best, but the portrait can only represent a single mood in a superficial way while the choice of furnishings very often reveals the secret ambitions of her inmost soul as clearly as if she proclaimed them from the housetop. The portrait shows only how she may appear at times; the house shows truthfully what she is. If her purpose is the comfort and happiness of her family it will be apparent; if it is to show her superiority over her neighbors, that too, will be quite plainly seen; if her desire be to keep up with some more prosperous rival or to hide her own poverty or to be in style—or whatever it may be—it will be impossible to hide it, and the wise woman is therefore honest with herself in choosing high ideals that will express themeselves to her credit.

Barry Parker, in the "Smaller Middle Class House," says: "The true method of making a room beautiful is to make all the necessary and useful things in it beautiful." This sentence gives the keynote for the expression of the chosen purpose—the necessary and the useful. If these are beautiful there will be little need for mere decoration, and the beauty which is a part of useful things well made will be found in all parts of the house instead of the painful profusion of the would-be beautiful in the parlor for the impression of the occasional guest, and the equally painful lack in the other quarters of the house which says that anything or nothing is good enough for the kitchen or back bedroom which are in daily use by the family.

Batchelder says, "The beautiful thing is always sane and orderly in its arrangement, clear and coherent in its expression, frank and straightforward in the acceptance of the conditions imposed by use, surroundings, tools and materials." "Frank and straightforward in the acceptance of the conditions imposed by use"—if this means anything it surely means that the house shall be furnished with a view to the comfort of those who are to live in it, and not to dazzle the eyes of our guests with the glory of our possessions. The chairs and tables will be strong and well built, inviting use; the rugs and hangings will be of fast sun-proof colors permitting sufficient light and air for the family without constant anxiety for these less precious possessions; the living room will be frankly the gathering place for the family, not a parlor reserved for callers; the kitchen will receive attention in proportion to its importance in the daily life, and will be as well supplied with convenient tools conveniently arranged as the family purse will permit.

Many persons, particularly professional decorators, attempt to secure a sense of unity in the house by adopting some historic style as the controlling motive, and we have houses furnished in the Queen Anne style of the Colonial period or the Louis XVI style of the Renaissance period. However successful this may be as an historic reproduction there still exist incongruities between the life and customs which produced the styles of other times and the conditions which surround us in this twentieth century, and these new conditions demand a new expression in keeping with our mode of living. We may go to the old for inspiration and suggestions to help in working out our present problems, but to attempt to graft sixteenth century styles on twentieth century conditions is as incongruous as to build a Gothic tower on a Moorish temple. Let us be ''frank and straightforward'' in accepting the conditions as they exist and endeavor to solve our own problems in our own way, using all the advantages of modern invention, as well as the heritage of past experience to help us create a style of our own which will be distinctive because it will be the expression of new conditions and good because it will satisfy a real need adequately and beautifully.

If the first essential in creating a beautiful home concerns a definite purpose and high ideals, the next is the tasteful execution of that purpose with attention to the fundamental principles of art in securing color, harmony and pleasing divisions of space. A few principles of general application may be profitably discussed from their practical application to the various features of the house.

The ideal floor from the viewpoint of beauty as well as sanitation is of hardwood, preferably oak, but in any case the bare floor relieved by rugs is greatly to be preferred to the carpeted floor. Small rugs are easily removed and easily cleaned and the tiresome sweeping of carpets avoided while the housekeeper has the satisfaction of knowing that the dust has been actually removed and not stirred up in the air to settle again in a few minutes.

Taking the room as a whole the floor should hold the darkest tone, the ceiling the lightest and the walls the connecting link between. The floor itself, however, should not be dark enough to show dust easily. The natural wood which mellows beautifully with age is generally most satisfactory.

In the treatment of the floor one coat of paste filler followed by two coats of wax gives a good finish. The second coat of wax should be applied several days after the first and a good rule for proportions is—little wax and much rubbing. Old soft wood floors may be quite successfully treated by scraping and sandpapering to a smooth surface and then applying a paste filler stained to match the dark spots which will appear after the sandpapering. A good crack filler should be used where necessary before applying the paste filler and the floor finished with two coats of wax as for hardwood.

The rugs may vary in value from the home-made rag rug to the costly Oriental, but if the colors are soft and in harmony with the other furnishings of the room the effect is sure to be good. A light rug is apt to be conspicuous and seems to rise in the room while the darker ones will "lie on the floor"—that is, attract less attention. For the same reason large figures and striking patterns are to be avoided.

Plain walls of a neutral tone are most restful and give a good background for pictures and other ornaments. The tinted wall is much to be preferred over paper or any other covering for sanitary reasons and the color applied to a semi-hard rough finished wall gives a delightful effect. If other covering must be used burlap gives a most pleasing effect and is very durable, but its qualities as a dust catcher are against it. If paper is to be used let it be plain or so nearly plain that it gives the effect of one color. The style to be avoided above all others is the large or striking design so arranged on a contrasting background that the figures fall into lines which run up, down and diagonally, compelling the eye to travel around the nerve distracting outlines of squares, diamonds and other geometric figures while one counts over and over again the spots that compose them. In the division of wall space two points should be noted—vertical lines tend to increase the apparent height of a room while horizontal lines, breaking the space in the other direction, tend to decrease the apparent height. In a low room, therefore, avoid borders and other marked lines about the room, and if too low vertical lines—as in the paneled effect—will seem to add height. On the other hand the effect of a very high ceiling may be modified by using the ceiling color on the walls down to the level of the picture molding, or by a wide decorative border or by a dado of different but harmonious tone. Here a figured paper if well chosen may be used to advantage.

The direction and quantity of light should govern the predominating color in a room. Brighten an otherwise dark room by light, cheery walls and hangings. Soften the glare in an over-lighted room by dull tones which absorb the light; neutral greens are specially good for this purpose.

If the woodwork in a room has poor lines the defect will be less pronounced if there is very little difference in color between it and the walls. If the furniture is old the fact will be emphasized by contrast with shining newness in paint and paper, while a background of dull tones will make the defect less conspicuous.

The furniture, being intended for use, should first of all be strong, well built and comfortable. A plain, substantial chair or table built on good simple lines is greatly to be preferred over one of the fancy variety having numerous curves and much machine-made ornamentation. Built-in-seats, book shelves and cabinets have many advantages. Being an actual part of the room the sense of unity is increased and being stationary, the labor of cleaning day is lessened. Much of the beauty of the old hand-made furniture is due to the fact that the maker was a master of his craft and knowing his material and its possibilities, designed accordingly, and beauty came as a natural result. The advent of machines which could accomplish in a few minutes results that would require hours of hand labor and multiply the product with the same amazing rapidity turned the heads of the workers for a time and led to all sorts of experiments as to what novel things could be produced. For a time the unusual took the place of the beautiful and the market was flooded with things which look like something which they are not—chairs made of good lumber carefully treated to make it appear like old ragged broken scraps, glass pitchers shaped like cloth bags ornamented with ribbon bows, and a host of similar grotesques. Much of the furniture produced in the last fifty years is overloaded with cheap machine carving, distorted into impossible curves, fancy and ugly, and finished with a glaring coat of varnish instead of the soft gloss of an old finish. We are fortunate in these days to have popularity and good taste so well combined as in the style of furniture designated as Craftsman.

The curtains, couch covers and other accessories are a very important factor in the harmony of a room and may be made to brighten a dull room or be the softening note where the light is too strong. Curtains of a soft filmy texture—a plain net, scrim or similar material are, as a rule, more attractive than those requiring starch and always better than lace unless the lace be of a very fine quality. In color they should generally be the neutral tone between window shade and the wall color, softening the hard outline of the window. The color effect may be secured with either plain or figured material, but if the latter is used, care is needed in selecting a color and pattern which will give the tone desired. Strong contrasts and striking designs are to be avoided.

In the city where houses are close together curtains are necessary as a protection from the curiosity of neighbors and must cover the whole window, but in the country their chief purpose is the artistic effect in the room and there is no need of interfering with the desire of the family to ''see out''—especially if the window commands a fine view.

Many points concerning curtains apply also to couch covers, especially the relation of the color to that of the room. No one feature adds more to the sense of rest and comfort in a living room than a luxurious pile of pillows on the couch—but let them be usable pillows, not fancy silk and satin creations nor of colors easily soiled.

Pictures should be few but well selected. Good prints of great pictures may be had at such low cost that there is no reason why any wall should be disfigured with cheap crude pictures. In hanging a picture the first thought should be for a good light where the picture will show to best advantage, and second, a suitable place into which it seems to fit—that is, a space of the same general proportions. Small pictures may be grouped to fill a space. The frame should not be more conspicuous than the picture but rather help to bring out what is best in the picture, and the wire by which it hangs should be invisible if possible. Family portraits have no place in reception and living rooms unless they are the rare ones which have real artistic merit. If we must have them let them be confined to our private apartments.

Of bric-a-brac as of pictures may be said—few pieces and well chosen—a good vase or two, a fine candlestick, a good cast of some fine piece of sculpture placed where their good lines can be seen to advantage. The thing most to be avoided is the cluttering of every available space with small cheap stuff—china vases with much gilt and strong color, colored glass bottles and cups, shell boxes and wax flowers, china shoes and silver hats and the whole range of things that look like something they are not. These things slip in from somewhere and it requires determination on the part of the Homemaker to keep down the accumulation and leave a clear field for the few really good things, but the result is worth the effort it costs.

This series of talks on House Decoration will scarcely be complete without some word regarding the most important feature of all—the homemaker herself. No matter how successful she may be in furnishing and caring for her home the capstone will be missing unless she herself is both in appearance and manner the most charming part of it all.

HOUSEHOLD MANAGEMENT.

(Mrs. F. B. Mumford, Columbia, Mo.)

The subject "Household Management" was assigned me by the program committee. The more I have thought about the subject, the more I have been convinced that it will not be possible in the time set aside for this discussion to consider all of its various activities in detail. While it is true, Household Management contains such a wide variety of subjects, there are certain general principles that may properly be discussed at this time.

Conditions for home making differ so widely that no two housekeepers have exactly the same problems, although the same principles may apply to all.

First, we study and understand our own problems. We must have a standard of life. By standard of life, I do not refer merely to an economic standard, but moral, social and intellectual standards that control our motives and ultimately result in successful living. It has been said, the great difference between a successful person who accomplishes much and the one who is inefficient, is the difference in which their standard of life has been made conscious. In other words, the women who succeed have studied their problems and have a clear conception of them.

The methods that made our mothers successful or those that are making our neighbors succeed may not always apply to our needs. The education and tastes of people differ so widely that it would be difficult to establish a universal standard of life.

Many of us have failed when we have been put to the test, because we have not had the courage to carry out our own standard of life. We are often more influenced by the opinion of others, than by our own good resolutions. The development of modern manufacturing enterprises, has taken out of the home many industries which characterized the homes of our mothers. The manufacturing of clothing, carpets, furniture and many other articles of household use, are no longer made in the home. To a certain extent, also, the preparation of food has been transferred from the kitchen to the canning factories, commercial bakeries and other food manufacturing establishments. While this is true much of this work is left in the home.

The preparation of food in the home is important, not only because it is one of the chief activities carried on by the housewife, but because a very large proportion of the income is expended in the purchase of the food and its preparation. It has been estimated one-fifth of the money expended for food is wasted in one of the five following avenues:

1. Needlessly expensive materials providing little nourishment.
2. Much thrown away that might have been utilized.
3. Bad preparation.
4. Failure to select rightly according to season.
5. Badly constructed ovens.

Many have realized the importance of one or more of these ways, but few women have been able to prevent waste in each of the directions mentioned. Very often a woman may be an expert in the selection of food material, but not a good economist in the prevention of waste.

If the attention of all women could be directed to these avenues of waste and this waste prevented, the ultimate result would represent a large saving in the important process of food preparation in the home. The utilization of our income is a most preplexing problem. So often the desires seem to exceed the income. In as much of the income is spent directly or indirectly upon the home, it is the housewife who has much influence in directing its expenditures.

First, she must distinguish between the needs and desires of her household. What these needs and desires are, will be determined by her standard of life.

The woman who directs these expenditures wisely, must herself be efficient in determining the value of things. She must be wise as to the time of purchasing. I do not wish to be understood as placing a higher value upon efficiency in these material activities of Household Management, than upon those activities concerning the promotion and development of the higher life in the family, but the limits of this paper forbid a discussion of this part of my subject. The thoughts and ideas I have had in mind but have not been able to express as successfully as I would have liked is expressed in a verse, called the "Mother's Symphony," by Fanny Waugh Davis, in Good Housekeeping:

"To do the best I can from morn until night,
And pray for added strength with coming light,
To make the family income reach alway,
With some left over for a rainy day;
To do distasteful things with happy face,
To smile, instead of frown at fate,
Which placed me in a family always late
To meals; to do the sewing, mending and
The thousand small things always near at hand,
And do them always with a cheerful heart,
Because in life they seem to be my part;
To know a place for everything and keep
It there; to bake, to answer questions,
To be the mainspring of the family clock,
(Or that effect), and see that no ticktock
Is out of time, or tune, or soon, or late;
This is the only symphony which I
Can ever hope to operate."

HOME CARE OF THE SICK.

(Dora B. Battson, Columbia, Missouri, Principal Training School for Nurses.)

> "Home, home, sweet, sweet home,
> Be it ever so humble there's no place like home."

Miss Battson.

The sentiment of this song has touched an answering chord in many human hearts in spite of the fact that the American people have grown to be a homeless people.

One of our great writers has said that given a roaring open-wood fire it is easy to create a happy family, from the soft-voiced mother, her knitting needles flashing in the light, and the grave but kindly faced father, his bronzed and knotted hands resting on his knees, down through the line of strong limbed, deep-voiced lads and rosy cheeked, bright-eyed lasses. But no one lives with imagination sufficient to conjure up a happy family group around a black hole in the floor.

With the coming of furnace heat and electric lights and the other modern conveniences, life may have lost some of its sentiment, but it has taken on new comfort and ease.

In the modern home the care of the sick is not particularly difficult, especially if you do as most doctors advise and call a trained nurse. Even a serious case of illness can be well cared for in a city home with a nurse on duty to report to a doctor, a few blocks away, any change for the worse in a patient's condition; but the situation is totally different when the home is a farm house half a dozen miles or more from the doctor and lacking all modern improvements.

One of the serious propositions in life is when a member of the family in the country is critically ill. Here, by all means, let me say, as a measure of economy, you should employ a graduate nurse. You will probably regard her as an extravagance till you have tried the experiment once, but when you have, I say with all confidence, I have no doubt you will repeat it.

If you have a nurse let her control the situation and concur with her in carrying out the doctor's orders. She is there for that purpose. It will be your duty to see that she has a reasonable amount of rest and recreation and wholesome food. You can best help the patient by caring for the physical welfare of his nurse.

But when serious illness strikes a farmer's home and he (for what may seem to him justifiable reasons), does not employ a nurse, the care of the sick becomes a matter demanding grave consideration. Here, of all places you see displayed, the goodness and kindness of humanity. The self-forgetting kindness of the neighbors is almost past belief to one accustomed to life among the selfish city dwellers. But right here is a grave danger—a cat may be killed by kindness and she possesses the fabled nine lives. Suffer me to give you a few don'ts for the farm-home sick room.

Don't allow the sick room to be the common sitting room—guard this point especially if the patient be a child. Neither should the room open into the dining room and kitchen. This is harmful for both sick and the well. Quiet and fresh air are *absolutely* necessary for the sick and neither can be obtained without some degree of isolation. If the family sit in the room they take into their lungs the oxygen needed by the patient and give out poisonous gases that add to his already toxic condition. Simply the presence of several in the room causes a nervous shock to the patient that does him harm. The look of loving anxiety bent on the patient makes him restless. The odor of clothes worn about the stables as well as the steam from cooking meats and vegetables may cause nausea persistent enough to endanger the life of the patient.

Don't let me beg of you, accept the offers of kind-hearted neighbors to sit up in groups of two or three unless they be deaf mutes. They *will* talk—they don't mean to, I know, and most of it will be done in that objectionable tone—a whisper, but to an ear keyed to hyper-sensitiveness by illness a low-toned whisper may be distinctly audible across the room and many a delirious patient has been rendered almost unmanageable by whispered conversation.

Don't trust to your memory in giving medicine. Write down plainly the hours at which all medicines are due and give them at exactly that time and always draw a line through the number, showing in this way that the medicine has been given. This will insure against his getting two doses either through your own forgetfulness or the kindly interference of friends. Do not ask him if he is ready to take his medicine or remind him it is time for it but quietly and unobserved, if possible, prepare the dose and give it at the exact hour. Above all, do not express pity for him when taking a nauseous dose, or make too elaborate preparations for him to throw it up. Here is where will power does a great deal, and the patient takes and retains medicine he deemed impossible.

Do not discuss the patient's condition a dozen times a day over the telephone in a voice distinctly audible in the sick room.

These are a few of the "dont's"—now listen, if you please, for a few moments to the "do's."

As soon as the doctor pronounces the indisposition a real case of illness, select the best room in the house for the sick room. By best, I mean the one where the patient can have the most quiet, fresh air and sunlight and be freest from the odors of the house, and where the excreta of the sick-room can be quickly and easily removed with least offense to the family. This room may be your much cherished parlor. If so, remove the carpet, if it be one you prize, and cover the floor with old but clean rugs easily removed for dusting. Be sure to remove the bric-abrac and books, as they always catch and hold the dust, and dust is danger in a sick-room. Dust every thing in the room daily with a damp cloth except your piano and use a flannel for this, taking the cloth outside to shake it frequently. The floor is swept by pinning a cloth, moistened in hot water containing a little carbolic acid, over the broom. Keep the shades up and have plenty of light and the direct rays of the sun, if you can, in the room. Not, however, in the patient's face or eyes—arrange the bed with this in view. There is health in sunlight and it is Nature's great ''non-poisonous'' germicide.

Have fresh air in the room day and night and whatever else you do or do not do, have fresh air. How to admit it in unstinted quantities in cold weather may be a great problem—but remember it *must* be done. Spend time and fuel keeping up a roaring fire if necessary, but keep the windows open. Please do not misunderstand me however, when I say fresh air—I do not mean drafts, nor do I mean necessarily cold air let in from an adjoining room where it has been heated over and over. I mean out-door-air, and I mean night air as well as day air. Open bedroom windows and out door sitting rooms have changed many cases of invalidism into health and energy.

As pure air bathes the lungs and cleanses the blood current, so must the daily application of water keep the body clean. A daily bath is necessary unless the patient be very old and feeble or the vitality be greatly reduced for some reason. I wish I might teach every woman in the land to give a bed-bath skillfully and change the linen without worry to the patient. Many do this quite well with no teaching save the nursing instinct inherent in some women. Always remember to protect your bed *well,* to expose only a small portion of the body at one time and turn the patient as seldom as possible. Daily fresh linen is worth making a great effort to obtain. The sheets should be as smooth as possible, great pains being taken to press out all wrinkles. It is best except under rare conditions, for the patient to wear only a night-dress while in bed. Many make a grave mistake in retaining union suits or other heavy under-garments. No bed patient can be kept really comfortable without frequent alcohol rubs, and this wearies the patient unless it can be done without disturbing him.

That which effects the patient's comfort most is his bed. Choose from among your beds the iron frame with firm springs so there will be no sagging of the mattress. The bed should be firm but not hard, and, for your own sake, should be put up on 8-inch blocks to prevent the distress of stooping over a low bed. Have your blocks the same height and hollowed in the center to hold the castors from slipping. Suffer a word as to the protection of your mattress (the feather bed, please understand me, is impossible)—the best protection, is, of course, rubber sheeting of a high grade, but this is difficult to obtain except through a hospital supply-house. Not having the rubber sheeting, get two one-yard pieces of the softest oil-cloth you can find and pin one firmly on the bed covered with a folded or draw-sheet snugly tucked under the mattress. Use the two pieces on alternate days, wiping them off with weak carbolic solution and hanging in the air when not in use. Bring out your best and softest blankets and do *not* use heavy, dark covers on the bed. The dark color depresses the patient and you will find a fresh white sheet, over the blankets, preferable to a heavy bedspread.

One member of the family should be set apart to care for the sick one—or if he requires constant attendance, two who can give their undivided attention to the patient. The physician will probably make two calls daily so the watchers should arrange their time for rest in such a way that the night-watcher will remain on duty for the doctor's morning call and be able to give a clear history of the night, while the other will be present in the evening and give an account of the day's doings.

Too often the burden of the home care of the sick rests almost entirely on the already over-weighted shoulders of the faithful mother, and many a brave life has been needlessly sacrificed on the altar of unselfish devotion.

Mother, when there is illness in your home, try and remember your life is the most precious in the household and be unselfish enough to share, in a large way, the care of the sick one with some one else. This is hard to do but the family should insist on your doing it.

The *mouth* is frequently neglected in the home care of the sick. Through a small breach in the dyke the country is flooded to its destruction. Through neglect to keep the mouth clean in many of the germ diseases serious complications set up that are fatal.

"For the want of a nail the shoe was lost,
For the want of a shoe the horse was lost,
For the want of a horse the rider was lost,
For the want of a rider the *kingdom* was lost—
And *all* for the want of a horse-shoe nail."

The mouth should be rinsed frequently and always before and after taking any form of food, with some simple alkaline wash, as soda or borax—readily found in any household. When the patient is too ill to do this for himself wind a pencil with soft table linen and saturate it in the solution and clean the mouth thoroughly, changing the cloth frequently and never dipping it twice in the solution. Oil the lips with cold cream or vaseline and be sure the corners of the mouth are well dried and oiled or they will fissure. If the patient is delirious the mouth must be prized open and cleaned at least three times daily. I may seem to stress this point unduly but if you could see one of the vivid pictures that hangs on the wall of my memory you would understand *why* this point appeals to me with so much force.

I see a wilful, petulant girl of 14 cared for by a doting mother through four weeks of typhoid fever. At the end of the fourth week her temperature dropped to normal but her delirium in place of disappearing, increased. The family, now worn out and alarmed, yielded to the doctor's demands and called a graduate nurse. I responded, driving ten miles into the country after leaving the train. I found a dilapidated and dirty farm-house around which the December winds wailed dismally. The mother and older sister were worn out, inefficient and spiritless. I found what I have always considered absolute necessities lacking—no clean linen or bedding—not even night dresses—no protection for the bed whatever and the patient well nigh out of view in deep excavation in a moist feather bed. The patient's hair—long dark curls—was matted almost hopelessly, the mother saying weakly that the girl had not allowed it combed for weeks. All this I might have overlooked, but when I opened the child's mouth I was filled with contempt and pity for the weak mother. When I asked her *why* the doctor's orders for cleaning the girl's mouth had not been carried out she answered dejectedly, "She just wouldn't let me clean her mouth." "You should have used force if necessary." "Oh, I couldn't do that with my little girl." In twenty-four hours I saw she had done worse—her lack of firmness had cost the girl her life. The usual typhoid symptoms had disappeared but the bacillus that caused the disease had entered the middle ear through the eustachian tube, leading from an unclean mouth and had set up an otitis media. The same infection had occurred through the ducts leading from the salivary glands and when death came, 9 days later, to the child's relief, both parotid glands had abcessed deeply and the sub-lingual and sub-maxillary were involved. Both ears were discharging freely—the shock and pain were too great and nature gave way under it.

What was my duty under the circumstances? I felt it was the *hard* thing—to tell her plainly but tenderly as possible, for her poor heart was quite broken, the truth—there were other children in the family. I will never forget her wail of distress, "If I had only known it *had* to be done!"

I hold the highest part of the mission of the trained nurse is not so much to *do* as to *teach*. Whatever home we enter should have better ideas of health and hygiene when we leave. Ask the nurse to show you how to do many of the simpler things in the care of the sick and you will find her glad to teach you some of the things she has spent three years in learning. I hope the time will soon come when every high school girl, will along with her cooking and sewing and other domestic arts, be taught the simpler technique of the sick room. Almost every woman is at some time in her life called on to act in place of a nurse to some one she loves. How gladly, then, would she exchange her A. B. degree for the knowledge and skill she knows she does not possess.

I will believe the millenium near, even at the door, when our girls are once more efficient home-makers and multiple mothers of healthy children. When in addition to a liberal college education they know the fine are of "home-keeping," and have learned the beautiful truth that "home-keeping hearts are happiest."

TRAINING OF CHILDREN.

(Mrs. J. Ed. Hall, La Monte, Mo.)

Mrs. Hall.

We best understand the feelings and affections of God toward us when we bend over *our own child*. and in our human parent-hood get a faint image of divine Father-hood.

The helplessness of children appeals to every principle of nobleness in our hearts. Their innocence exerts over us a purifying power. Our responsibility for them exalts every faculty of our souls. In the very care which they exact, they bring blessings to us. Life takes on a new and deeper meaning. When we realize that into our hands has come a sacred burden—an immortal life—to be guarded and trained, we are made more thoughtful.

Self is no longer the center. A new object, great enough to fill our life, and engross our highest powers, is now before us. Life becomes *real,* and parents begin to learn to live in reality, only when the children come.

We speak of training our children, but they train us first, teaching many a sacred lesson, rousing up many a slumbering gift and possibility, calling out many a hidden grace and disciplining our wayward powers into noble and harmonious character.

Some writer has said that the children are apostles sent forth to preach of love, of hope, of peace. Dreary, indeed, would our homes be, without them. True, we sometimes weary of their noise; they bring care, solicitude, and toil. Sleepless nights we spend in watching over them, and last, but not least, do they almost break our hearts many times by their waywardness.

Some there are who see no pleasure in them, but regard them as responsibilities which they dread, and do not care to assume. This, to me, is sheer selfishness, for instead of being hindrances to noble living, they are great helps. They bring blessings from heaven when they come, and as long as they stay, they are true benedictions.

How shall we train them? It is impossible to overestimate the importance of this question. In the language of the poet:

> "It is no little thing
> When a fresh soul
> And a fresh heart, with their unmeasured scope
> For good, not gravitating earthward yet,
> But circling into diviner periods,
> Are sent into this world."

We realize as parents, as mothers, that upon *us* the responsibility of these young lives chiefly rests. We are the *home builders* and we put into the home *our character,* of whatever sort it is. In many homes fathers seem to forget that they have any share in the burden and duty of *home life.* But this is wrong. While God has placed the tender plant nearest the mother-heart, yet the father must know that he has more to do in making and training the child, than simply supplying necessary food and clothing. How sweet is the home where mother and father are one in thought and in spirit, where their hearts beat as one, where the welfare of the children lies equally heavy upon each heart. Socrates wondered how men could be so careful to train well the colt, but were so indifferent to the training of the child. And in this Christian age is it still true that men, who profess to follow Christ and to believe life superior to all else, give infinitely more thought and pains to the raising of stock and the growing of crops than to the training of the children?

I think you, as mothers and home-makers, will all agree with me that our lives are indeed busy and crowded, and we find it hard to do everything that we should, but if we allow business, pleasure or *any other interest* to crowd out the training of our boys and girls, we have made indeed, a fatal mistake. For if the child is not taught in the home, by its parents, principles of honesty, truthfulness, charity, right living, industry, etc., the impressionable mind will be filled with wrong principles and the character which God intended to be well rounded and beautiful, will be sadly warped and disfigured. The wise Solomon said, "Train up a child in the way he should go and when he is old he will not depart from it." Oh, that we could realize this, every moment of our lives, and remember we are training, not only for time but for eternity!

Every home influence, no matter how small, works itself into the heart of childhood and re-appears in the opening character. To quote the words of the lecturer on last evening—"The child absorbs environment." The influences that surround the child in infancy should be such as to fashion strong noble manhood and queenly womanhood. Homes are the real schools in which men and women are trained, and fathers and mothers are the real teachers. The lovely things that come out in the life of the strong man had their origin in the lovely thoughts that were whispered into his heart in early childhood. How essential it is that the mother do this herself, whenever it is possible, not entrusting this very important thing to some stranger.

The mind of the child is easily impressed, and as the earliest impressions are the most lasting, let us surround them with the beautiful, the pure, the uplifting things.

The house, its shape, color, location, decorations, the yard, the lawn, the woods, fields and streams—all are intertwined with his early memories of childhood. And what beautiful pictures they are—hanging on the wall of memory, if the scenes to which the canvas was exposed were but beautiful.

God pity the poor children in the great cities, who live in wretched hovels and into whose young lives no thoughts of a beautiful and happy childhood can come.

While I feel that all this about material surrounding is very true, yet I believe that you will all agree that there is also a spiritual side. The home and all its surroundings may be ideal, but without the sweet home spirit, the spirit of love, the lives of the children will not be complete, something will certainly be lacking. And this tender life must begin with the parents themselves. If gentleness and affection mark their attitude toward each other the same spirit will rule the family life.

How can we as parents, as mothers, undertake and expect to accomplish the great task set for our life work, without Divine aid? Can we afford to meet the solemn responsibility of parenthood in our human weakness? May we seek the aid of the Great Leader and with His presence, help and guidance, even this work of training our children will not weight us down, but we shall come out more than conquerors, having for our reward a great army of noble men and pure women who sooner or later are to take our places.

TEXTILE ADULTERATION.

(Miss Charley Tidd, Department of Home Economics, University of Missouri.)

Miss Tidd.
(From kodak picture.)

A woman who has spent quite a number of years in working for pure food legislation remarked the other day, that twenty years had been spent in investigating the subject before there was any legislation on it. She said that people had worked in laboratories, getting technical knowledge, and presented this information to the people, but that it took this length of time for public opinion to be aroused sufficiently to cause laws to be enacted. It seems only reasonable that if this subject, which affected not only the economic condition of the people but their very lives as well, was not attended to for twenty years, that the question of textiles which affects only the economic side, will take at the least as long a time if not longer. Our problem, then, is to see what the women of the country can do in the meantime, to see how they can come to their own aid and protect themselves against the frauds which are being forced onto them.

The adulteration of textiles is chiefly in that of the quality. We buy woolen, or silk, or linen material, supposing that it is "pure," and then we find that it may contain a large amount of cotton, or hemp, or shoddy. But by the time that we make this discovery the goods is worn out and all we can do is to go to the store and buy more. As a matter of fact, even if we discovered the fraud in the first place we have no means of redress. We can either buy the material or we buy some other, which in the long run will probably prove just as bad as the first. The manufacturers claim that they must adulterate goods, or make a poor quality, as they call it, in order to meet the demand for a cheap product. This brings up the question as to whether these so-called cheap products are really the cheapest. Granted that they are in the initial cost, what about the lasting qualities. An investigation which has been recently carried on goes to show that toweling, which cost only two cents more on the yard would last three years longer, a length of time out of all proportion to the extra cost. And this is usually the case with other things besides towels.

One may very well ask at this time whether the price of a material can be relied on to express the real quality. To some extent this is so, but there are so many other factors which enter in that it is not a safe thing to do. The fact that a thing is in style, or fashionable, determines the price more than the quality of the material. But admitting that this can be used as an index to the quality, as long as we have nothing better, the question still remains as to whether we are getting the best quality. Are we getting our money's worth? What right has the manufacturer to give us pure table linen, guaranteed as such, when half or a third is cotton?

And what does he mean by this guarantee any way? Miss Crooks, who has done a great deal of work along this line, has found in her questioning that it means very little. She found that you could not get your money back, if the thing proved cotton instead of linen, and that you had no recourse to law.

One of the first things which we can do, then, is to make it our business to see that this guarantee does mean something. Our ultimate aim should, or course, be to have a law which would give us protection in a case like this. But until this time comes we can get the merchant not only to say that the material is pure, but to back his statement up by promising to replace the material if this is not true. This simply means that the merchant will in his turn force the manufacturer to make the same promise to him, so that he will not be the loser. But we must be able to tell in some way as to whether we are getting pure material or not. This is a necessary step. Of course we can tell by the length of time the article lasts. But usually if we wait that long to determine the quality, we find that it is easier to go and buy more than to take the trouble to replace the old. And then the fact arises that if you wear a garment for any length of time the merchant can claim that it was the kind of wear which the material received and not the quality which caused it to wear out. We must be able, then, to tell about the quality before we purchase the material. The way by which we can do this has been worked out by the textile chemists. They have worked out a series of simple tests which can be carried into the home and used by every woman. They have found that if a piece of material is pure wool it will all dissolve in a solution of ordinary lye. But that if it is part cotton that part will not be dissolved. Of course, even then that leaves the possibility that the wool may be adulterated with shoddy. If the woman is the possessor of a miscroscope this will be a very simple thing to discover. If linen is bought it can be analyzed to find out whether it is linen or cotton. White material can be soaked in glycerine. If linen, it becomes transparent, while if it is cotton it will become opaque or a dead white. By burning the edge the fiber can also be determined roughly, the linen fibers burning off straight, while the cotton ones will have a small tuft. Silks are perhaps the most adulterated, as they are the most costly. But here the adulteration consists not only in being adulterated with another fiber, but by being loaded. This can easily be discovered by burning the piece of material. If the material is loaded it will retain its shape. As a matter of fact you will find that it will not burn. If the silk is not weighted it will burn rapidly. To test the pureness the fibers can be boiled in a solution of lye or some strong alkali. This will dissolve the silk and will leave the cotton undissolved. These are just a few of the most simple tests which seem to be practicable. Any woman can try these at home. They can be carried on with just the small samples which the merchant will give you, or if this is not enough, surely it will pay to buy a few cents worth of the material to test first.

Before any laws can be passed we must have facts to present to the people. All women know that textiles are adulterated, all know that the average silk dress, costly as it is, will last but a short time, and then there can never be any assurance as to how long it will last. But until the women who use things can give accurate information as to the extent of the adulteration and what its effects are, very little will be accomplished. The pure food people accomplished only what they did by presenting specific facts to the people and showing what the harm was, both to the individual and to society. And until textile workers can do the same, very little will be done. But textile workers can do little alone, as the pure food workers could do little alone. It takes the people behind any movement to make it a success. And in this instance it takes the women in particular. Until every woman who buys a piece of cloth knows, or at least tries to know, the quality, nothing can be done.

WHAT THE WOMEN ARE DOING IN MICHIGAN AND WHAT MICHIGAN IS DOING FOR HER WOMEN.

(Miss Jennie Buell, Lecturer Michigan State Grange.)

Miss Buell.

It was in 1895 in Michigan, that an increased appropriation for farmers' institutes permitted of the broadening of this work and encouraged the superintendent of these institutes, Mr. K. L. Butterfield, to attempt something especially for the help of farm women. Realizing that the work of no class of workers is so closely associated with the home as is that of the farmer, it seemed but just and needful that a considerable share of attention and funds be given to the helping of the home side of rural life. The first trial women's section—for it was decided to begin with a separate meeting for women at each county institute that wished for it—was held in November of that year, conducted by Mrs. Mary A. Mayo, a woman whose intimate acquaintance with farm life and wide acquaintance over the State well fitted her to introduce this feature.

The experiments justified continuance of the work among women. Because it was a meeting for women and led by a farm woman, it appealed to the shy, often lonely, farm woman; and because it was a meeting filled with high ideals and noble appeals for right living, it appealed to women from the towns. It tied these two classes together along the lines of their common interests. It discovered to them, as one little woman once said, that ''about the only difference between them is the matter of a few miles.'' Town and country women's clubs have resulted in a number of instances, that meet regularly during the year, and where the meetings are held only annually, they are events long looked forward to. The discussions there started are frequently extended over months among the women of the vicinity.

Ever since this sort of work was started, in connection with our Farmers' Institutes, provision has been made for a woman speaker at every county that desired to have the women's section, or congress From six to eight or nine thousand women are thus annually reached by this means. The subjects presented have from the first tended to the practical, living problems that home-makers have to solve. Especially have the difficult and delicate questions of child culture and training been sought for by the women who attend these meetings. ''Mother and Daughter'' has been a favorite theme, under this or similar titles. Often a women's congress becomes almost a confessional in its strong, heartfelt utterances, its eager questions and earnest answers, its exchange of practical suggestions and instructions. The chief and crying need of many mothers, was early, found to be *how to teach* their children that which they had learned about the relations of life, about their own natures, personal hygiene and regarding sex. A little later, instruction along lines of Household Economy was given, often with demonstrations. As studies of this sort were introduced into the public schools, trained teachers were available for their presentation, and the work of instigating further study of their calling went on among these women in homes.

The aims and results of such special effort among women through the farmers' institutes have been in three directions: 1, inspiration or awakening women to think more about their duties and responsibilities; 2, instructing, with the hope of leading to further study and thought by pointing to sources where more extended helps may be had; 3, development by doing, showing the women how to conduct meetings among themselves, what topics call forth most interest and how to find local assistants for carrying on the work.

We are convinced that one such meeting a year does not suffice to carry out this plan in its desired fullness. Where no other agency exists to meet the need among the women, we encourage permanent organization among them with regular meetings throughout the year; but if other organizations are already in the neighborhood, we encourage women to take a larger participation in them for the discussion of topics relating to home life and its betterment, the installing of labor-saving devices and up-to-date equipment of conveniences. Many of these topics bear more substantial fruit if discussed in the combination men and women's meetings, but the women must first know what is available in the way of modern conveniences, helpful reading matter, home study courses, better schools for her children, artistic and sanitary furnishing for her home, etc., before she is quite ready to present her needs to another. This sort of breaking ground in her thought the women's congress often does for her. Sometimes it also does her quite as much good by wholly redirecting her thought life, as by giving her practical suggestions in her material, work-a-day world. For instance, one woman testified that out of such a meeting she caught her first vision of what her highest duty to her husband and children might be—something above working at the barn and in the field and doing her housework between whiles. She saw the possibilities that were hers as companion and leader to her family in social ways and in mental and spiritual life. Her experience in less measure has been that of thousands of Michigan women whose lives have been quickened and enriched by these meetings among women, by women and for women.

WHAT MISSOURI SHOULD DO FOR ITS WOMEN.

(F. B. Mumford, Dean Agricultural College, University of Missouri.)

We must recognize that the work of women is made more effective by special training as well as the work of men. Missouri has provided more generously for the special training of men than for women. Larger attention should be given in schools to courses in Home Economics. Not only in the colleges and universities, but in the high schools and rural schools of the State.

The management of a household is too important to be placed in the hands of ignoranf, untrained and inefficient women. The development of modern applied science has clearly indicated the usefuless of careful training in the duties of house keeping.

It is fitting that the Home-makers' Conference should recognize the need of special training for women, and should take the necessary steps to secure this training for the women of Missouri. It is not too much to hope that such training will improve the economic condition of the home, the intellectual life of the home-makers, and ultimately result in a fuller and happier life for all the homes of the State.

PLANS FOR FURTHER ORGANIZATION.

(Miss Ilena Bailey, Farmers' Institute Lecturer, Board of Agriculture.)

Miss Bailey.

Many a farmer's wife arises at 5 o'clock in the morning and retires at 10 o'clock at night with nothing but work between these hours. No wonder if she looks forward to the time when they will sell the farm and move to town. However, the work done in other states, our own observations and dreams of the future make us believe it is possible to keep all the beauties of Missouri country life and replace many of the undesirable features with the desirable features of city life.

The farmer's wife needs a library with its books and magazines, picture galleries, good lectures and musicals as much as the city woman. She needs time for leisure and for intellectual development, time to enjoy the beauties of country life. We are beginning to reap larger crops when scientific methods are applied to agriculture, so when these are applied to the home we will have more artistic houses, more conveniences and more nutritious food for the same cost as at present. When we understand sanitation there will be less disease. All of these advances can be secured more quickly through organization.

A home makers' club in every school district would help to bring them. Four or five women could start such an organization. The most good comes from a club of not more than fifteen members, because each member has a chance to take part often and there is less formality. Ask your neighbors in to spend an afternoon. Talk this matter over with them. Organize a club. The exchange of ideas will help all of you.

Several nearby clubs could unite and have a "short course" of one or two weeks once a year. This would consist of a series of lectures and demonstrations by members of the University faculty and farmers' institute lecturers. It would be like a school.

The club could hold its meetings at the homes of the members every two weeks. By having the club in the community, it will make it possible for members to attend every meeting. Some women will feel that they are too busy to spare an afternoon once in two weeks, but if that time is so well spent that it will make work at home done with less time and less labor, is it not a paying investment?

We hope the suggested constitution and by-laws and the program outline will be a help to you, but make your own if you wish. The constitution names the necessary officers. It was made with the expectation that a farmers' club would be organized in the same community, but this not necessary.

The executive committee should see that the papers, talks or discussions are assigned to various members several weeks in advance, so that they will have time to think and read on their subjects. If members think they have not time for this, meet anyway and talk about these subjects. If you happen to miss a meeting, have the next one as planned in the outline, as these meetings are arranged to suit the seasons. The president should see that no other general subject than that planned by the executive committee is discussed, otherwise you will not be able to carry out your program. Perhaps you will want to add music or literary work to these programs, or you may wish to separate or combine some of the subjects. If you carry out the plans under special work, the meetings will be more interesting.

The references are all bulletins that can be obtained free of charge. If your secretary will write me for material, I will send this to you as you have need for it.

When there is business to come before the club, the business should follow the program. Any business left over from a previous meeting should be considered first, then new business. Try to do business in a parliamentary way, even though the business is a small matter. With everyone talking at once and no order a business meeting becomes a long drawn out affair which never reaches a conclusion.

To have a pleasant and profitable meeting, refreshments are not a necessity, but should you wish these, the number of articles to be served should be limited to two or three. Remember, the principal objects of a home makers' club are not eating and embroidery.

There may be times when it will be advisable to have an extra meeting, as when you have an opportunity to get some special speaker to meet with you or wish to invite your families or friends to a social evening occasionally.

The State Library Commission would be glad to loan such clubs a collection of fifty books for the transportation charges. These charges are small. The books may be kept six months and returned. They may be on various subjects or along special lines, for old or young, as you wish.

Your secretary should keep in touch with other clubs of like purpose in the State. This can be done through the office of the State Board of Agriculture. This will enable us to send all club members such new printed matter as is of interest to them.

Too many things in this world are left for someone else to start. If you have received inspiration from this Home Makers' Conference, start a club in your own community. Ask your neighbors in to spend the afternoon. Talk it over together. Organize. With your hearty co-operation, we can hope for great improvement in the farm home and farm life in Missouri this year of 1911.

PROGRAM OUTLINES FOR ONE YEAR.

FIRST JANUARY MEETING.

General Subject—Organization for the Year.

Program—

1. Reports of secretary and treasurer.
2. Plans for the year.

Special Work—

Roll call, each member answering by telling how the club has helped her or how it could be of more help.

SECOND JANUARY MEETING.

General Subject—Report of Home Makers' Conference.

Program—

1. The Trip.
2. Columbia.
3. The Meeting.
4. Our University.

References—

If you sent no delegate, read the reports in the daily papers of Columbia and in various state agricultural papers.

FIRST FEBRUARY MEETING.

General Subject—Breeds of Poultry.

Program—

1. Is Thoroughbred Poultry Profitable for the average Farmer?
2. Advantages of having only one Breed.
3. Which is the most Profitable—the Egg, Meat, or General Purpose Breed?

Reference—

Fourth Annual Report of the Missouri State Poultry Board.

SECOND FEBRUARY MEETING.

General Subject—Young Poultry.

Program—

1. Which Shall it be—Incubators or Hens.
2. Brooders.
3. Feed for Young Chicks.
4. Chicken Diseases.

Special Work—

Ask each member to bring a written question on poultry. Give each member a question to answer.

FIRST MARCH MEETING.

General Subject—The Vegetable Garden.

Program—

1. Soil and location.
2. When and How to Plant.
3. What to Plant.
4. Care and Results.

Special Work—

Let each member answer to roll call, telling what variety of vegetable grew in her garden last year.

References—

Farmers' Bulletins—

No. 154. Garden, Preparation and Care.
No. 149. The Farmers' Vegetable Garden.
No. 255. The Home Vegetable Garden.
No. 11. Growing Early Tomatoes.

SECOND MARCH MEETING.

General Subject—The Flower Garden.

Program—

1. The Lawn.
2. The Flower-bed.
3. Unsightly Back Yards.
4. The Roadside.

Special Work—

Each member might make a list of unsightly objects around a farm house.

References—

Farmers' Bulletins—

No. 195. Annual Flowering Plants.
Ornamental Planting for the Farm Home.

FIRST APRIL MEETING.

General Subject—Our School.

Program—

1. How can Our School House and Grounds be Improved?
2. The Advantages of the Consolidated School to Pupils.
3. The Advantages of the Consolidated School to Patrons.

Special Work—

Have each member give an idea for improvement.

References—

The School and the Farm in Report of Home Makers' Conference, 1910.
Bulletin, The Model Rural School.

SECOND APRIL MEETING.

General Subject—The House.

Program—

1. Wall Finishes.
2. Which is Better—Rug or Carpet?
3. The Kitchen Floor.
4. Points to be Considered in Selecting New Furniture.

Special Work—

Let each member tell about the next change she plans to make or would like to make in her house.

FIRST MAY MEETING.

General Subject—Milk and Butter.

Program—

1. Which is More Profitable—to Make Butter or Sell the Cream?
2. How Can We Get Better Prices for Butter?
3. Unseen Filth in Milk.

Reference—

Farmers' Bulletins—

No. 241. Butter Making on the Farm.
No. 186. Keeping Quality of Butter.
No. 63. Care of Milk on the Farm.
No. 210. The Covered Milk Pail.
Milk Supply for the Home.
Report of Home Makers' Conference, 1909.

SECOND MAY MEETING.

General Subject—Vegetables.

Program—

1. Methods of Cooking Vegetables.
2. Food Value.
3. Cream Vegetable Soups.

Special Work—

Have some member demonstrate the effect of cooking potatoes different lengths of time. Let each member tell how she prepares some vegetable.

References—

No. 256. Preparation of vegetables for the table.
The Cooking of Vegetables, Report of Home Makers' Conference, 1910.

FIRST JUNE MEETING.

General Subject—Marketing of Poultry.

Program—

1. Feeding for the Market.
2. When to Market.
3. Where to Sell.
4. Runts and Culls.

References—

Fourth Annual Report of Missouri State Poultry Board.

SECOND JUNE MEETING.

General Subject—Canning Fruit.

Program—

1. The Advantages of Home Canned Fruits and Vegetables.
2. Preparation of Fruit for Canning.
3. Methods of Canning—Steaming, Baking and Boiling.

Special Work—

Demonstration in canning by some member.

References—

Farmers' Bulletins—

No. 359. Canning Vegetables in the Home.
No. 203. Canned Fruit, Preserves and Jellies.

How to Can Fruits and Vegetables on the Farm—Report of Home Makers' Conference, 1909.

FIRST JULY MEETING.

Picnic—

Program—

Songs, Recitations and Speeches.
Dinner.
Games.

Special Work—

Get old and young from every family interested.

SECOND JULY MEETING.

General Subject—Prevention of Disease.

Program—

1. Typhoid.
2. Tuberculosis.
3. Infant Mortality.

References—

Directions for Living and Sleeping in the Open Air.
Information for Persons Having Diseases of the Lungs.
Bulletin of the State Anti-Tuberculosis Association.
Open Air Crusades.
What the Women of the State Can Do Toward the Prevention of Infant Mortality and Some Recent Advances in Infant Feeding, in Report of Home Makers' Conference, 1911.

FIRST AUGUST MEETING.

General Subject—Bread.

Program—

1. Principles of Bread Making.
2. The Score Card.
3. Does it Pay to Buy Bakers' Bread?
4. Uses for Old Bread.

SECOND AUGUST MEETING.

General Subject—Clothing for Children.

Program—

1. Material and Design for School Dresses.
2. Finishing Garments.
3. Fitting Shirt Waists.
4. The Best Dress.

References—

Principles of Art Applied to Dress, Report of Home Makers' Conference, 1910.

FIRST SEPTEMBER MEETING.

General Subject—Egg Production.

Program—

1. The Chicken House.
2. Feeding for Egg Production.
3. Relation of Feed to Flavor of Eggs.
4. How can We Secure Better Prices for Eggs.

Special Work—
Let each member draw a plan of a poultry house.

References—
Fourth Annual Report of Missouri State Poultry Board.

Farmers' Bulletins—
No. 262. Experiment Station Work.
No. 122. Experiment Station Work.
No. 186. Experiment Station Work.

SECOND SEPTEMBER MEETING.

General Subjects—School Lunches.

Program—
1. Nutritive Food for Children.
2. The Underfed and Overfed Child.
3. Eating between meals.
4. Manners at the Noon Hour in Rural Schools.
5. What City Schools are Doing.

Special Work—
Demonstration to show an attractive school lunch.

References—
U. S. Bureau of Education, Bulletin 403, No. 3, Daily Meals of School Children.

FIRST OCTOBER MEETING.

General Subject—Meats.

Program—
1. Difference in Methods of Cooking Tender and Tough Cuts of Meat.
2. What to Use in Place of Meat.
3. Left-overs.

Special Work—
Have some member demonstrate the cooking of meats in different ways.

References—
No. 34. Meats—Composition and Cooking.
No. 391. Economical Use of Meat in the Home.
The Cooking of Meat—Report of Home Makers' Conference, 1909.

SECOND OCTOBER MEETING.

General Subject—Modern Conveniences.

Program—
1. Which is Best—Attic Tank, Windmill or Pneumatic Tank?
2. Fixtures and Plumbing for Kitchen, Laundry, and Bath Room.
3. Sewage Disposal.
4. Substitute for Modern Conveniences.

Special Work—
Each member might estimate the cost of putting modern conveniences into her house.

References—
Engineering Experiment Station, University of Missouri.
Bulletin No. 2. Water Supply for Country Homes.
Bulletin No. 3. Sanitation and Sewerage Disposal for Country Homes
Running Water in the Country Home.
Report of Home Makers' Conference, 1910.

FIRST NOVEMBER MEETING.

General Subject—Light and Heat.

Program—
1. Cleaning Kerosene Lamps.
2. The Advantages of Acetyline and Electricity.
3. The Well Built Fireplace and Chimney.
4. The Advantages of a Furnace.

References—
Bulletin 1, Acetylene Lighting for Country Homes.

Special Work—
Let each member score a loaf of bread by the score card. Compare scores.

References—
No. 112. Bread and the Principals of Bread Making.

SECOND NOVEMBER MEETING.

General Subject—Thanksgiving.

Program—
1. The Well Planned Meal.
2. The Attractive Table.
3. Thanksgiving Dishes.

Special Work.
Each member plan a dinner menu.
Demonstration of the properly set table.

Reference—
Planning Meals, Report of Home Makers' Conference, 1910.

FIRST DECEMBER MEETING

General Subject—Christmas Plans.

Program—
1. The True Spirit of Christmas Giving.
2. Christmas Candy.

Special Work—
Each member make a suggestion for a gift.

SECOND DECEMBER MEETING.

General Subject—The Guest.

Program—
1. Entertainment for Guests.
2. Little Courtesies.
3. The Unexpected Guest.

Special Work—
Members work on Christmas presents.

CONSTITUTION FOR LOCAL HOME MAKERS' CLUBS.

ARTICLE II.

This organization shall be known as the...................... Home Makers, Club.

ARTICLE II.

The object of this organization shall be to promote interest in home and farm life by the following means:

Section 1. Making a careful study of homemaking and house keeping.

Section II. Stimulating the interest of the young in all that concerns rural life.

Section III. Encouraging the introduction and development of agriculture and domestic science in our rural schools.

Section IV. Maintaining a high standard of moral, social, and intellectual culture in the community.

Section V. Co-operating with county and state organizations working toward the same end with the..Farmers' Club.

ARTICLE III.

Any woman may become a member of this club by signing the constitution and by-laws.

ARTICLE IV.

Section I. The officers shall consist of a president, a vice-president, a secretary and a treasurer.

Section II. The officers shall be elected by ballot at the annual meeting, and a majority of the votes cast shall elect.

Section III. The executive committee shall consist of the officers and such other members as the president may appoint.

ARTICLE V.

Section I. The duties of officers shall be such as usually pertain to these offices and shall arise from the provisions of this constitution, or of by-laws that may be enacted.

Section II. At each annual meeting and at such other times as the club may require, the treasurer shall make a detailed report of the receipts and disbursements showing the financial condition of the club. This report shall be filed with the secretary.

Section III. It shall be the duty of the executive committee to be active in promoting the interests of the club and to arrange programs for the meetings.

ARTICLE VI.

Section I. An annual meeting shall be held for the election of officers and for the transaction of such other business of the association as conditions may make advisable.

Section II. Regular meetings shall occur as provided in the by-laws, and special meetings may be called at any time by the president.

Section III. Except in amending the constitution and by-laws, all questions before the club shall be decided by majority vote.

ARTICLE VII.

This constitution may be amended at any regular meeting by a two-thirds vote of the members present, notice of such amendment having been given one month previous.

BY-LAWS.

ARTICLE I.

The parliamentary proceedings of this club shall be governed by Roberts' Rules of Order.

ARTICLE II.

The annual dues shall be......................

Other assessments may be levied on each member by a vote of the association.

ARTICLE III.

Any member who, after two month's notice, fails to pay such dues and assessments, shall be deprived of her vote.

ARTICLE IV.

Officers shall be elected by ballot at the annual meeting held on the...........day in January of each year.

ARTICLE V.

Vacancies in office shall be filled by election.

ARTICLE VI.

The regular meetings shall be held monthly at the same time and place as that of the ....Farmers' Club.

ARTICLE VII.

A quorum to transact business at any regular meeting shall consist of five members, but a less number may adjourn. A majority of the total membership shall be necessary for a quorum at a special meeting.

ARTICLE VIII.

These by-laws may be amended at any regular meeting by a two-thirds vote of the members present.

THE QUALITY AND COST OF A CUT OF BEEF.

(P. F. Trowbridge, Professor of Agricultural Chemistry, University of Missouri.)

Prof. Trowbridge.

In selecting our cut of beef we are limited by the quality handled by the local butcher as well as by our lack of knowledge of what constitutes the best and most profitable cuts to buy.

In the large city market the housewife can usually find all grades of beef, and can select according to taste and pocketbook, provided she knows what she wants and can tell if she gets it. In the smaller towns usually only one grade of fresh beef is handled and the housewife can use her judgment only in the selection of the different cuts.

Plate one represents a steer weighing about 1,250 pounds, well fattened, and from which the very best prime beef is obtained. Beef from such animals is only to be found in the best city markets.

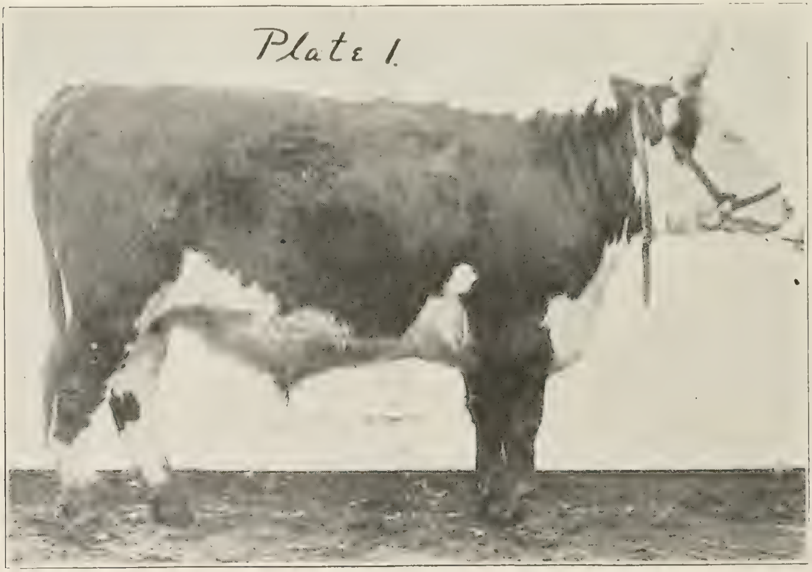


Plate two represents a fat cow, weighing about 1,000 pounds, and making an average quality of beef known as butcher's stuff. This class of animal will fairly represent the source of a large portion of the beef cut up in the average market in the smaller towns. It is frequently tough, but usually of a good flavor. Considerable beef from younger cows and heifers is also used in many country towns.

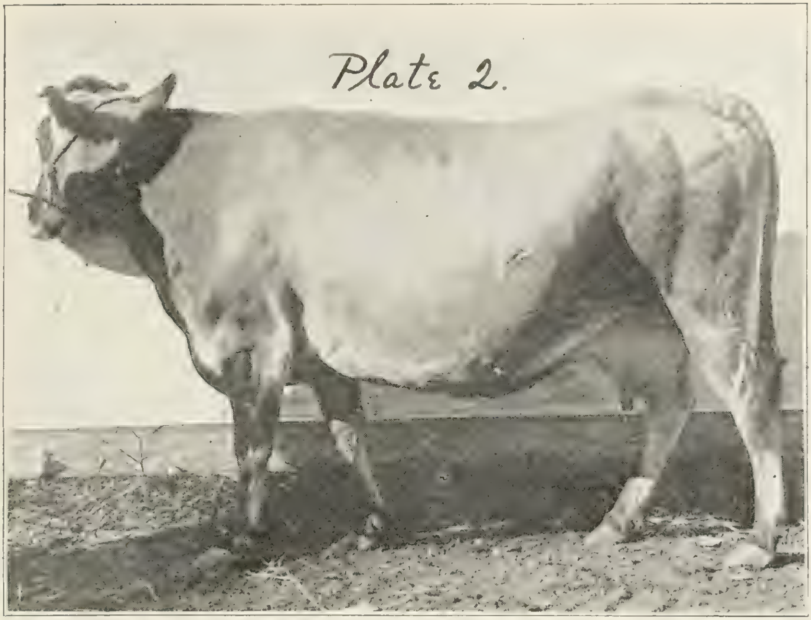


Plate 2.

Plate three represents a well fattened steer about one year old and weighing about 800 pounds. This class of animals produces the best baby beef, and such meat is not usually found in the markets of the smaller towns. Such beef is usually very tender; it is lacking in flavor, is of a grayish color and unless well fattened is apt to be vealy. This class of beef is very popular, because of the tenderness, and because steaks and roasts can be cut which will not be too large for the small family.

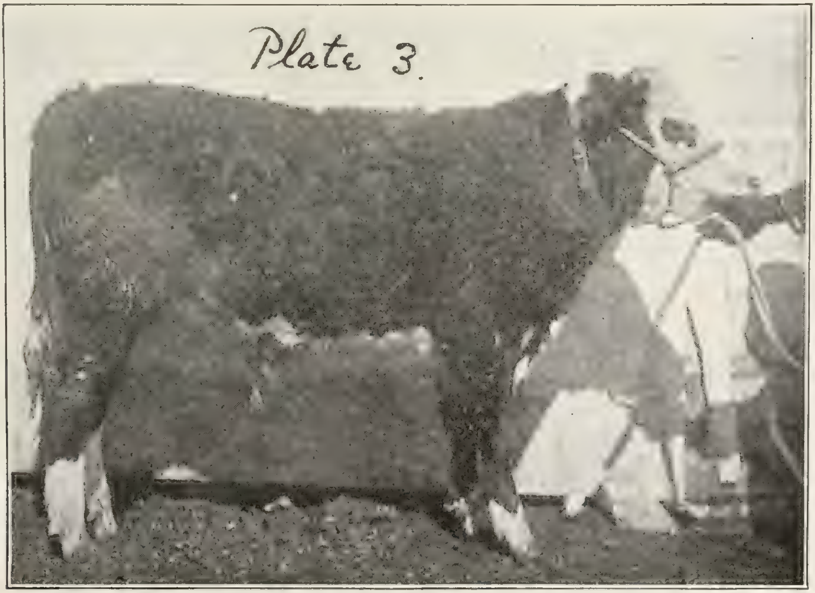


Plate 3.

Plate four gives the two views of a side of prime beef, and shows the relative position in the animal of the different wholesale cuts. The carcass shown in this plate yielded the following percentages of the different wholesale cuts:

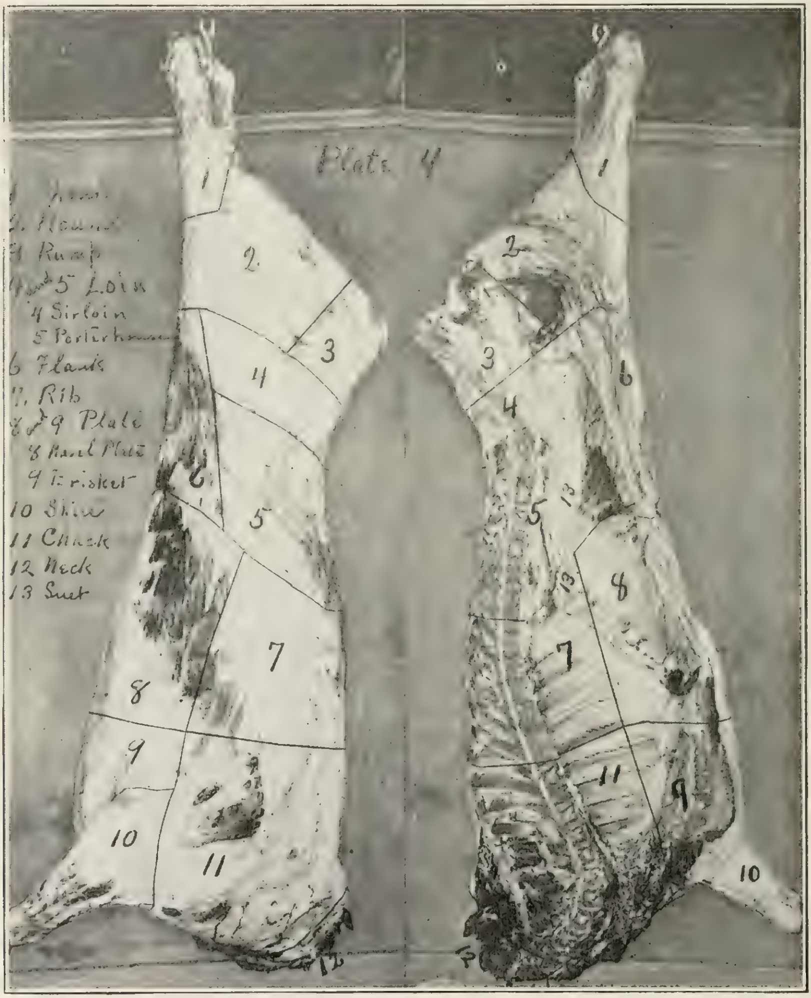


Plate 4
1 Shank
2. Round
3 Rump
4 and 5 Loin
4 Sirloin
5 Porterhouse
6 Flank
7. Rib
8 & 9 Plate
8 Navel Plate
9 Brisket
10 Shin
11 Chuck
12 Neck
13 Suet
1
2
3
4
5
6
7
8
9
10
11
12
13

1. Shank	2.7	
2. Round	17.0	
3. Rump	3.5	
4 and 5. Loin	17.8	
6. Flank	2.5	
13. Suet or kidney fat	2.4	
Total hindquarter		45.9
7. Rib	10.1	
8 and 9. Plate	15.5	
10. Shin	4.5	
11. Chuck	23.0	
12. Neck	1.0	
Total forequarter	54.1	100.0

Retail prices differ considerably in different places. In smaller towns there is less difference in the retail price of the different cuts and the general retail price is usually lower than in the larger places. The retail price of meat in Columbia is higher than in most of the other cities of the same size. In fact, Columbia is to be classed with Boston, Philadelphia and Pittsburg in the price asked by the butchers for the best cuts of beef. The quality of the beef sold in Columbia is only medium. Few strictly No. 1 or prime cuts are sold here. The most of the meat sold here grades as No. 3, or "butcher's stuff," with retail prices as follows:

Porterhouse steak or roast, 25 cents per pound (short cut).
Sirloin steak or roast, 20 cents per pound.
Round steak, 18 cents per pound.
Standing rib roast, 15 to 18 cents per pound.
Chuck steak, 12½ to 15 cents per pound.
Chuck roast, 12½ cents per pound.
Rump roast, 15 cents per pound.
Plate stew, 10 cents per pound.

Recently the writer visited the largest butcher shop in Troy, Mo., and was given the following retail prices for beef: Porterhouse, sirloin and round, 12½ cents per pound; rib, chuck, rump and plate, 10 cents per pound. This market claims to kill all their own cattle. Meat is selling considerably lower in Kansas City than in Columbia.

COST OF A POUND OF LEAN MEAT.

In most families but little fat beef is eaten, therefore the cost of the edible lean meat is the important consideration for the average housewife.

The following table (No. 1) shows the distribution of the lean, fat and bones (hand separated) in the different cuts of the prime beef shown in plate four; while in table two is given the same distribution for the good fat cow shown in plate two.

TABLE 1.

Distribution of Lean, Fat and Bone, Steer No. 121. Prime Beef.

Cut.	Lean, per cent.	Fat, per cent.	Lean & fat Meat, per cent.	Bone, per cent.
Shank	28.1	13.5	41.6	57.8
Rump	44.7	32.9	77.6	22.2
Flank	46.3	53.2	99.5	0.4
Chuck	62.8	21.4	84.2	15.1
Shin	52.2	13.1	65.3	34.1
Plate	53.9	34.3	88.2	11.5
Neck	54.3	21.9	76.2	23.6
Loin	54.8	33.3	88.1	11.1
Rib	61.1	21.5	82.6	17.2
Round	72.2	17.0	89.2	9.2

TABLE 2.

Distribution of Lean, Fat and Bone, in Cow No. 4. Good Beef.

Cut.	Lean, per cent.	Fat, per cent.	Lean & Fat Meat, per cent.	Bone, per cent.
Rump	38.9	39.6	78.5	20.4
Flank	40.5	58.4	98.9	0.3
Shank	41.1	2.1	43.2	55.9
Plate	55.3	30.1	85.4	13.8
Loin	57.6	29.3	86.9	12.5
Shin	58.2	4.5	62.7	36.2
Rib	59.4	23.8	83.2	16.1
Neck	67.2	8.5	75.7	22.6
Chuck	73.8	11.7	85.5	14.5
Round	81.4	9.1	90.5	9.1

In these two animals the per cent. bone in the same cut does not differ widely. In the per cent. of lean there is considerable variance, showing the influence of breed and sex. Both animals were slaughtered at about the same general condition of fatness. It will be noticed that the chuck and round in the cow contain a higher per cent. of lean than in the steer. While the loin of the steer is more muscular than that of the cow. The cow (especially the dairy cow) shows a tendency to store up the fat on the inside of the body.

In tables three and four are shown the cost to the consumer of the edible lean meat of the different cuts calculated at the retail prices given in the table and with the composition shown in tables one and two.

TABLE 3.

Cost of Edible Lean Meats to the Consumer. Steer No. 121. Prime Beef.

Cut.	Selling price per pound.	Cost of lean meat per pound.	Cost of lean and fat per pound.
	Cents.	Cents.	Cents.
Shin	8.0	15.3	12.3
Shank	5.0	17.8	12.0
Neck	10.0	18.2	13.1
Plate	10.0	18.6	11.3
Flank	10.0	21.6	10.1
Chuck	15.0	23.9	17.8
Round	18.0	24.9	20.2
Rib	18.0	29.5	21.8
Rump	15.0	33.6	19.3
Loin	22.0	40.1	24.9

TABLE 4.

Cost of Edible Lean Meat to the Consumer, Cow No. 4. Good Beef.

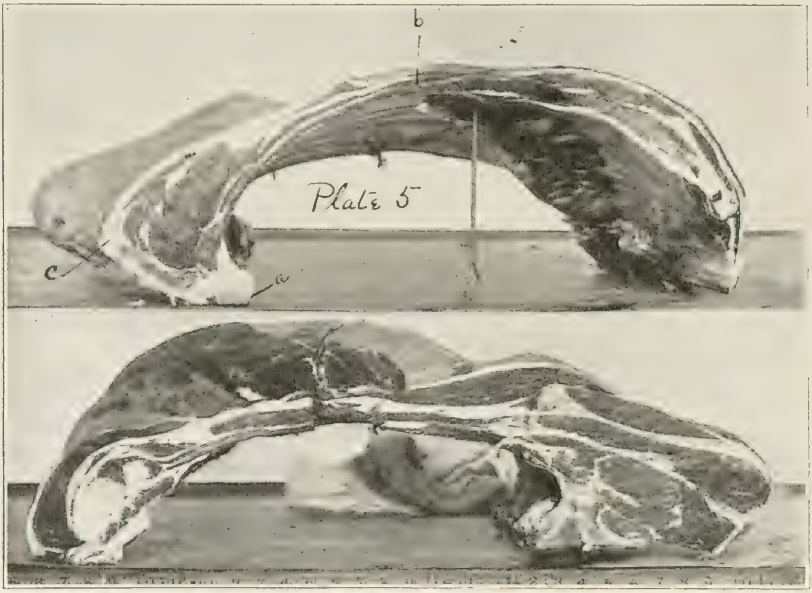
Cut.	Selling price per pound.	Cost of lean meat per pound.	Cost of lean and fat per pound.
	Cents.	Cents.	Cents.
Shank	5.0	12.2	11.6
Shin	8.0	13.7	12.8
Neck	10.0	14.9	13.2
Plate	10.0	18.1	11.7
Chuck	14.0	19.0	16.4
Round	18.0	22.1	19.9
Flank	10.0	24.7	10.1
Rib	18.0	30.3	21.6
Loin	22.0	38.2	25.3
Rump	15.0	38.6	19.1

In the steer, all of the stew and soup cuts (so called cheap cuts of meat) furnish the lean meat at a lower price than the roast and steak cuts. This is in addition to the value that may be given to the soup stock derived so largely from the bones. In the fat cow the flank contains so much fat that the lean costs more per pound than the lean of the chuck or round.

In both animals the chuck furnishes the cheapest lean of cuts that are suitable for steaks or roasts. Too many housewives think they must get only rib or loin for nice roasts or steaks. The chuck has been regarded as suitable only for pot roasts or for steak and roasts for the cheaper boarding houses. A chuck from a prime steer is superior to the rib or loin of ordinary "butcher's stuff" and can be bought for considerably less money. Reference to plate four will show that a roast from the last two ribs of the chuck cannot differ much in quality from one from the first two ribs of the rib cut. The rump is a very popular cut, because it is so suitable for small roasts. The present retail price, however, makes it one of the most expensive cuts of meat to buy, considering the amount of lean meat that is obtained.

Plate No. five gives two cross sections through a steer carcass scarcely fat enough to be strictly prime beef, but still of a quality much above that of average beef. The upper view shows the tenth rib, looking forward. The lower view shows the sixth rib, looking toward the rear of the animal.

On each view is indicated where the plate is cut off from the rib. The upper view shows what is supposed to be about the best cut of the rib. The lower view shows the rib cut nearest the chuck and can always be recognized by the piece of the shoulder blade. Before roasting, this bone should be removed and the meat held in place by skewers. This will greatly facilitate the carving at the table.



In studying cuts of beef it will be helpful to remember that a beef animal has thirteen ribs. The first five are left on the chuck; the next seven constitute the standing rib cut, and the last rib is left on the hindquarter and is cut off in the first two porterhouse steaks. Nearly all of the shoulder blade is in the chuck. A small piece over the sixth and seventh ribs is cut off with the rib cut.

The lower end of the first five ribs and the breast bone (sternum) is in the forward or brisket end of the plate. This cut makes about the best corned beef, and is also good for stews. The lower ends of the next seven ribs (cut from the standing rib) is in the rear or navel end of the plate. This cut is especially fine for stews and for short ribs of beef to be roasted and served with browned potatoes.

A standing rib cut should measure (at the twelfth rib) nine and one-half to eleven inches from the chine bone (''a'' on plate 5) to the point marked ''b.'' The heavier the beef, the longer the rib end can be cut without making an ill-proportioned roast. With light beef, it is frequently desired to make a boneless rolled rib roast, and then the rib should be cut three or four inches longer so that the thin boneless strip will be long enough to cover the lean eye of the beef to the point ''c'' and cover the surface of the roast with a layer of fat. In ordering such a roast it is well to ask the butcher to send the bone with the meat. You are charged for the full weight before the cut is boned out. This will enable you to check your weights and the bones are valuable for soups.

Prime beef should be fat enough to have a god covering of fat over the outside which will insure a certain amount of fat distributed through the lean. The juiciness of a piece of beef does not depend upon the amount of moisture it contains, but upon the amount of fat distributed through the lean. Therefore, the fatter the beef the juicier it will be. If we can afford to buy the extremely fat beef and throw away the excess of outside fat, we will secure the highest quality of a lean meat. The outside fat from a fat beef is softer and better than lard for all purposes.

The lean of a round steak contains more moisture and less fat than the lean of a loin steak from the same animal, as shown in the following table (No. 5), therefore, the loin steak or roast is always sure to be the more juicy cut.

TABLE 5.

Composition of Lean of Round Cut.

Animal No	504	4	593	121	591
Moisture, per cent	69.51	70.22	73.80	69.96	75.27
Fat, per cent	9.21	7.12	4.31	8.18	2.31
Protein, per cent	20.05	21.62	19.75	20.52	20.31
Ash, per cent	0.98	1.06	1.00	0.96	1.00

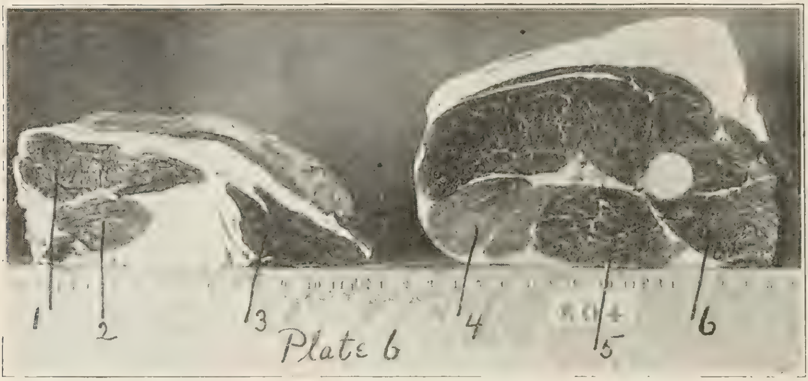
Composition of Lean of Loin Cut.

Moisture, per cent	66.92	67.01	71.27	67.22	74.63
Fat, per cent	12.22	12.22	7.56	11.40	.343
Protein, per cent	19.07	19.84	19.38	18.80	20.13
Ash	0.95	1.03	0.95	0.94	1.00

Animal No. 504 is represented in plate one. No. 4 in plate two, No. 593 in plate three, No. 121 in plate four, and No. 591 represents a very thin steer about eighteen months old. The fat content of the lean is a good index of the relative juiciness of the meat. In every case the loin lean contains more fat than the round lean of the same animal. In some animals the round lean contains fat enough to make it a more juicy cut than the loin lean of another animal. It is interesting to note how uniform the actual protein content is of all lean beef.

Animal 593 was good baby beef but it cooked dry and vealy because of the limited amount of fat stored in the lean.

In plate six is shown a cross section through the loin two vertebrae forward of the pin bone (hip bone), and a section through the round where the bone is of smallest diameter. These cuts are from carcass of steer shown on plate 1, and represent an ideal for prime beef of the respective cuts.

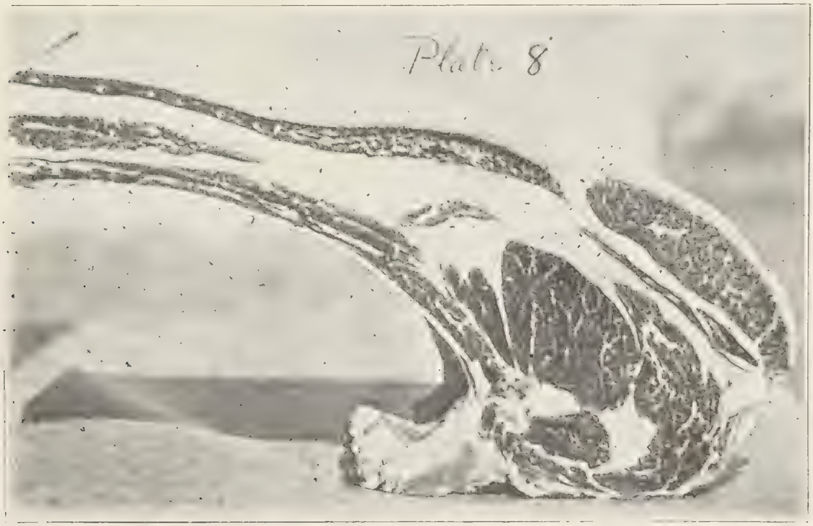


Number one indicates the loin back muscle; two, the tenderloin; three, the flank muscle. The tenderloin is very tender, but is usually not considered as well flavored as the loin back muscle. The flank muscle is cut lengthwise of the fibre and is relatively tough. When it is desired to serve a very choice cut of loin as steak or roast, the flank muscle should be removed and used for stews or hamburger. Attention is called to the excellent covering of fat over the loin which indicates prime beef. The large amount of kidney fat is of but little value, but it is sold with the loin and very materially adds to the cost of the edible lean. The "T" shape of the bone shows very nicely in this cut and in many markets these porterhouse steaks are called "T" bone steaks.

In the round cut attention is particularly called to the separate muscles, 4, 5 and 6 of the outside of the round. Muscle six is tender but muscles four and five are almost always tough. The large inside muscles shown as the upper half of the cross section is the tender muscle of the round, and from a fat animal is to be preferred to the loin cut of a thin animal. The large amount of fat covering the inside of the round indicates the finish of the animal. In serving a round steak it is well to use muscles four and five for hamburger, as these muscles will never make a satisfactory steak.

The chuck is a suitable cut for both steaks and roasts and can be cut advantageously from the back end parallel with the ribs or from the lower portion. When cut from the lower side, the round bone (see plate 7) of the arm, shows, giving a cut which has some resemblance to a round steak and for which it is sometimes sold.

In plate No. 8, is shown an ideal standing rib roast taken from a very fat show steer. The very high degree of marbeling of fat all through the lean is beautifully shown. In this cut the great excess of outside fat has been removed. Such a cut is only ideal and cannot yet be produced. In order to secure the marbeling, the outside fat must be from two to three inches thick and for most persons this is waste material put on the animal at a prohibitive cost.



SOME OF THE PROBLEMS OF THE RURAL SCHOOL.

(Mrs. Marie T. Harvey, Kirksville, Mo.)

Mrs. Harvey.

Because of the comprehensive discussion of country life problems by Superintendent Kern, and the character of the program that follows this number, I have determined to attack my subject quite differently from that planned previous to my coming here.

Rather will it be my purpose to suggest ways that I believe practicable by which the women of Missouri may help our country youth *now* in our homes and schools by bringing about a more rapid evolution of the typical school shack into the twentieth century type of consolidated school, the only solution for the problem of education in the country community.

When I say "The Women of Missouri," I am not thinking of farmers' wives only; I mean all women—the club woman, the social worker, the mission worker, the mother in town and country—the woman who believes in the divine right of every child to make the most of himself, and who believes it is the duty of the State and the community to give him this chance by providing adequate means for the education of the whole child. I shall refer to conditions and problems, therefore, in a somewhat disorganized way, and emphasize these for the sole purpose of showing a logical basis for the closing appeal.

* * *

What we are about to say is with full knowledge of the facts that there are most excellent country schools in all parts of Missouri, country schools that are better than many graded schools; that some of our best teachers labor from choice in the country; and that the young teacher with her first school in a remote district often does work of the highest merit. That this is true only proves what may be done in all country schools in general.

That there is a pitiful and unnecessary waste of child life in the country will not be difficult to prove; that we cannot logically offer a remedy for a condition not generally understood, and that we cannot afford to be sensitive about facing *facts* so long as we rank *seventh in population and twenty-ninth in education,* I feel quite certain you will agree. I am constrained to remark in passing that Missouri's rank in population does not give me the concern felt in some quarters regarding this phase of the census returns; nor do we need immigration of the class we have been receiving in the past to force her rank upward; rather do we need to conserve Missouri's richest heritage—her boys and girls—by making the best possible provision for their mental, moral and physical development. "Preserve the child and you preserve the State." It is her rank in literacy that should claim the attention of every educational force in Missouri, for the conditions that obtain in the majority of country districts are largely responsible for their depopulation, and the exodus of our best types of men and women into the already overtaxed cities.

The little red school house, so dear to the memory of us all, made a wonderful contribution to elementary education in the nineteenth century, and was a potent force in the development of true Americanism. It served its best purpose during pioneer days when industry was centered in the home where they used to grow their own food, spin and weave their own cloth, make their soap, dip candles; where the child was called upon while still young to share his parents' activities that gained for him an insight into the industrial processes, habits of work and training for his future occupation. *Then* the school was properly a place to which children were sent for a few hours a day to pick up the essentials of reading, writing, arithmetic and spelling, and a little information about geography and history.

This is the twentieth century; industry has passed forever from the home to the factory system. Science, like physics and chemistry, has become a vital factor in the productive process in country and city alike. The home can no longer give the boy and the girl training for life's work. The impossibility of the one-room school doing this must be apparent to all present.

Do you realize that there are school houses yet in Missouri made of logs with dirt floors, without equipment, where the "best scholars," mere boys and girls, are *invited* to try the county examination by the severely tried county superintendent who "passes" them to secure teaching material? As late as October 23d, the metropolitan papers of the State gave a detailed account of conditions so exceptionally bad in one district that three teachers up to date, had refused to continue work there.

In a populous and prosperous county in another section, there is a district noted for the contrast between schoolhouse and barns, the barns having decidedly the better of the comparison. The school house is built on piles with large cracks in the floor, which let in so much cold as to compel children to sit on their feet much of the time to prevent frost bites during severely cold weather. Its equipment is in keeping with its structure. The yard, bare and bleak, joins a cemetery on the one side and slopes so as to carry the drainage from both yard and cemetery into the well which furnishes the drinking water for that group of helpless children.

It would amaze Missourians generally to know how many school buildings have no water supply, in how many districts children are forced to go long distances for the "pail" of water, *or learn to do without* rather than drink water that is distasteful because unclean.

Besides wretched, ill-kept, poorly furnished, and inadequate school buildings *which are the rule, not the exception,* of what else is there to complain? Numbers are too small to present conditions for successful work. What are the disadvantages in small numbers? Briefly, small numbers kill the spirit of emulation in work and in play. The classes in fully three-fourths of our schools are exceedingly small, containing in hundreds of instances *but one pupil.* While individual instruction should never be precluded, there is high value in class instruction; mind clashes with mind; the spirit of emulation is aroused; the interest is sustained, and advance more rapid. If a school is to prepare for life, there must be enough children in the school room or on the ground, to make social life a reality. The small school fails to give the child a true notion of what community life is since with but few children in a school group there is no particular right to defend or duty to perform.

What else? Poor classification, short terms, frequent change of teachers, teachers deficient in scholarship, teachers not in sympathy with country life, incompetent and disinterested school directors, patrons unthinking hence inactive, school houses located so that children must walk excessively long distances, bad roads and so on. Enough suggested.

It has become popular to charge the country teacher with the responsibility of the low status of education in country districts. This is a story in itself. We touch upon it merely to suggest thought on *how* and *why* the supply of competent men and women for teachers is not equal to the demand in the country. The compensation of teachers, as well as preachers, has always been inadequate, and in these days of rapidly increasing cost of living, it has become impossible for men and women with no other source of income to remain in a calling that calls for an outlay of time and money in preparation entirely disproportionate to the salary usually paid. Because brains and energy are better paid in other callings, many competent men and women will no longer teach school. And, too, few ever pause to consider the serious and inexcusable hardships with which the teacher of their children must contend: the inconvenient and oft-time uncomfortable boarding place, short term of employment, smaller salary than the city teacher whose work is lighter, the poorly equipped schoolhouse, few social pleasures and opportunities. Is it to be wondered that we find the personnel of the country school corps changing almost entirely every three years? Can you expect to secure well-trained fully developed teachers for your children without considering the factors just mentioned? Is it not fair to place the responsibility for such conditions where it belongs—with the parents and voters?

Again; the small school serves but few people; it is supported by the taxes raised on a comparatively small amount of property, therefore neither the public interest nor the financial support is likely to encourage the development of the school. The fact is—although not yet generally understood by those directly concerned—that the average country school, which yields so little, costs the taxpayers anywhere from one hundred per cent to several hundred per cent more than the most elaborate system of city schools. Therefore, because of the facts here cited and other causes, there is not time to discuss, a degree of efficiency in keeping with what *modern* conditions require of the public school cannot be maintained.

How acquiescent we are towards that which is customary! Children trudge long distances through rain, snow and sleet; face biting winds; sit all day in an unsanitary house with damp feet and clothing; for what? The majority of parents scarcely realize the serious risk to their children in these long, lonely walks to and from school; accidents that come from thoughtlessness, the serious consequences from unguarded associations, exposure during storms—yet they permit such conditions to exist generations after generation. These are the conditions under which seventy per cent of Missouri's children secure their education, because these seventy per cent are in the country; thirty-five per cent get less than a fifth grade education; five per cent only receive a high school education; there is a tremendous and inexcusable waste of child life in the country through lack of opportunity, yet no class of her youth gives greater promise of usefulness. These children deserve a right to school privileges in every way equal to those in the best city school systems. Can such advantages be given in the country? Yes, in due time, and in many places by establishing larger school units and transporting* children to the central school.**

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*February, 1910, Bulletin Missouri State Board of Agriculture.
**December, 1908, Bulletin, State Normal School, Kirksville.

Because Superintendent Kern has shown you the picture of the John Swaney Consolidated school of Putnam county, Illinois, "a country school beside a country road where a right balance of educational values is being maintained," I urge you to get and read the report of the "Committee on Industrial Education in Schools for Rural Communities"*** as suggestive of what can be worked out in Missouri—when once the possibilities and obligations of the country school have taken hold of us; when once we realize that the real solution of the problem in this country (for after all, the *school problem* is but a phase of the *country problem*), lies in co-operation; the co-operation of economic, social and educational forces with the school as the center.

Since Professor Emberson has discussed fully the university's important work in this field, I shall merely add that all the State's educational institutions are giving strong emphasis to education for country life offering courses in subject matter and theory that will fit teachers for good services in such districts.

The State Normal School at Kirksville has rendered a distinct service in demonstrating that transportation over dirt roads kept in fair shape by dragging, is practicable in North Missouri, at least. Twenty children are brought to the Model Rural School on the campus by a wagon whose driver, himself a patron of the school, lives five miles from the school. The wagon runs on schedule time, picks up the children at the various stations enroute, and delivers them regularly, punctually, comfortably and happy for their daily work; this it has done for four years.

This point is brought out because it is believed by many that transportation is impracticable, and because our present "Consolidated School Law" is useless, lacking provision for the transportation of children at public expense, which provision we hope will be made by the present session of the General Assembly.

In behalf of the children now in our homes and schools, I believe firmly in stimulating the evolution of our country schools by vigorous organization, expert leadership and wise legislation. One of the chief functions of legislation is to create conditions favorable to legislation. For the sake of the children, we women of Missouri need to concern ourselves more seriously with law-making. The sixtieth report of the State Superintendent of Schools is as interesting for the report of educational bills that *failed* to pass as for those that become laws. Will you not drop a card for a copy and examine for yourselves?

Bills provide State aid for the establishment of high schools that de-

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***Second Report on Industrial Education in Rural Schools, Irwin Shepard, Winona, Minn.

mand higher qualifications for the teacher—that will make a compulsory educational law—*compel* irresponsible parents to give their children an elementary education, that will do away with the public drinking cup, that will permit women to vote on school questions and be eligible to membership on school boards—in short, all measures looking to the enlargement of the school's usefulness in the community should be followed by parents and all good citizens, and their legislators promptly instructed to work for their passage.

* * * *

I have suggested several phases of the country school problem with sufficient frankness, I hope, to cause each one of you to investigate conditions in your respective locality, and to encourage your activity in making needed improvements to the end that boys and girls all over Missouri shall have equal advantages; that at least they shall have a sound foundation upon which to rest high school and college training.

Let our elementary schools in the country be made as efficient as possible, and *take them to the door of every boy and girl in Missouri.*

THE RELATION OF THE HOME MAKER TO THE SCHOOL.

(Mrs. Cora A. Chapin, Appleton City, Mo.)

Mrs. Chapin.

This is the first time I have had the pleasure of attending the Home Makers' Conference. I am certainly enjoying every moment. The talks, papers, discussions and lectures have indeed been very interesting. When Miss Bailey wrote asking me if I would give a few minutes talk I replied that I would try. My husband says it is no trouble for me to talk, but I found trouble in thinking of something to say that was worth while.

Having visited our district school the day before I received Miss Bailey's letter, I decided to make a plea for the Home Makers to visit our schools, as I found I was the first visitor the teacher had had this year, and I am not a patron of the school for I have no children. As I taught in Missouri and in Colorado before I was married, you may be sure my sympathies are with the teacher. I hope you will excuse this personal introduction.

I do not believe our Home Makers realize the importance of our public schools. I believe ignorance to be the main cause of most of the troubles that we have in this world, therefore we must do all that we can to dispel ignorance. The most important factors in a successful school are, first, the teacher; second, the patrons; third, school building and surroundings; and fourth, the pupils. After hiring the best teacher that one can get for the money, she or he, can be improved and encouraged by the Home Makers taking an interest in the school. Visit the school. Call on the teacher at her home or boarding place. Let the teachers know that you expect them to be of some account and they will try harder. All of us need encouragement occasionally. You may say, ''I have so much to do I can't go,'' or ''I can't leave the children,'' or ''I can't get a horse and buggy.'' Take the children with you; they will enjoy visiting big brother's or sister's school, too. Get the good father to take the horse and buggy and go along too. You might have it arranged with the neighbors to take turns going. You might agree to take your darning with you. One could listen and observe and darn too. Perhaps you will find the building cannot be properly ventilated. Get someone to fix the windows so that they can be lowered from the top, or else have a board made to fit in the window when it is raised so that the air can enter the room without striking the children's heads.

Encourage the children to sing for you. I actually know of country schools where they never sing. Just think of it! You may find the floor is so cold the children cannot keep their feet warm. Get the patrons to bank around the house with dirt. I hope the time may soon come when all schoolhouses will be heated with a furnace. Are the decorations such that you could not add to them? Maybe you have a good book that you could give to their library. If the school yard is large enough to admit of a flower or shrub garden, haven't you something that you could give them?

If Johnny or Mary are not doing well in some subject, find out why. If they are troublesome in school, see to it that they do right. I have found that where the parents co-operated with the teacher, there was usually no trouble with the pupils. If you have visited the school, you will know better how to talk with the children when they come home with their complaints. If you have a Farmers' Club that meets at the schoolhouse, why not take up a subscription and offer prizes to the boys and girls for the best potatoes and cow raised, and best apron made, or best bread baked, etc. On Thanksgiving Day have a neighborhood dinner and have a program, and award these prizes.

I have said nothing about the directors, as they are usually included among the patrons. Don't expect them to take too much interest, as they get no pay for their work.

In the success of the school I put the pupils last. They, as a rule, are what their parents, teachers and surroundings make them. I used to always feel more like punishing the parents than the pupils, although I never tried the experiment.

I could go on and on until you were all weary. That reminds me of the saying, "Blessed is he who knows when to begin; but thrice blessed is he who knows enough to stop."

As an old teacher I beg and implore the Home Makers to visit the schools and encourage and uphold the teachers. Parents will be more than paid by the increased interest the pupils will take their studies.

Thanking you for your attention to this rambling talk, I again plead with you to visit the schools.

HOME ECONOMICS IN RURAL SCHOOLS.

(R. H. Emberson, Professor of Rural Education, University of Missouri.)

Prof. Emberson.

I have been asked to make a talk on the subject "Home Economics in the Rural Schools." During the past twelve months the chief burden of my message to the people of Missouri has been the improvement of the rural schools, or, more properly speaking, the rural school problem, and if I should say some things this afternoon along that line, you will please excuse me, because I do not wish to discuss the subject assigned to another; it will be due to the force of mental habit.

One of the most significant facts in current educational history is the introduction of agriculture into the rural schools. A great deal has been done in Missouri along this line during the past year. It may be claimed that the subject was introduced at an inopportune time; that it would have been much better to wait until teachers could be prepared to present this subject in a satisfactory way. While there is some force in this argument, still it would have taken several years for the Agricultural College, the normal schools, and some of the best high schools, all working together, to have prepared teachers for this special line of work. Be that as it may, the subject has been introduced. In the language of Grover Cleveland, "It is a condition, and not a theory, that now confronts us." Elementary agriculture has been put into the common school course in our rural communities and the special problem now is to make it worth while.

A prominent farmer in one of our southern counties asked me if I encouraged girls to pursue this subject. My reply was that I did.

The following incidents will give my reasons for doing so. In the corn show held in Livingston county last year a special premium was offered to the boy or the girl who could select the best ear of corn. This premium was taken by a little girl not more than 14 years old. In a teachers' and parents' meeting held in Mound City, Missouri, very recently, a special premium was offered to the boy or the girl attending rural school, who would present the best note book on agriculture. This premium, as well, was taken by one of the girls of that county. This is evidence to show that girls can pursue this subject with great profit and educational advantage to themselves.

However, I have claimed from the beginning of my connection with the Rural School Department of the University that a course in elementary Home Economics should be provided for the girls. This course should be similar in nature to the great body of subject matter composing the common school curriculum. From the very nature of the case it can not be specialized. It must deal with the great fundamental facts of the science. It must be general and not particular. It must deal with the subject of foods, clothing, sanitation, decoration and so on.

The life of the farmer differs very greatly from the life of the men living in the city. The merchant's business is separate and apart from his home. The lawyer, doctor, railroad employee—in fact nearly all business men—have their offices or shops away from the home. The hours of the day are spent in the place of business. A few hours during the evening are spent at home. With the farmer this is different. His business is about his home. His house, yard and garden are a part of his daily care and work. If this is true in regard to the farmer himself, it is also true of the farmer's wife. Home Economics as a study relates to the home and its environments. A good definition for Home Economics would be The Science of Home Making.

While I have always accorded to women the right of equal opportunities with men, equal opportunities to become self-supporting and independent, and am willing to open to them all avenues of legitimate business, still, I am one of those who hold to the old theory of our fathers and grandfathers, that a woman's interest and greatest pleasures will always center in and about the home. I claim to be a remnant of that old Missouri-Kentucky-Virginia stock who believe that in the home the woman should rule as queen. It is to this end, namely, that the home should be a delightful and inviting place for women, that I insist that home economics be given a place in the common school curriculum.

During the recent years the pedagogical arena has accentuated the following statements: Appeals to the child's interests; find the point of contract; correlate home and school. This sentiment or philosophy seems to have found a place in our educational system, and home economics is one study that will do much to bring about this desired change in pedagogical movements. The subject will appeal to the girl's interest. It will begin with the things that she knows, will interest her in these things and lead her on to further investigation along these lines. It is one study peculiarly adapted to bring about a closer relation between home and school. But let it be distinctly understood that it is not the aim of home economics to teach some of the higher, more delicate things of home life, such as making Battenburg lace, trimming hats, and preparing some of the dainty pastries, it should deal rather with things that are more fundamental, more permanent, more practical.

Much complaint has been made by both teachers and parents that a great deal of the subject matter now taught in the schools is dry and dead and meaningless. This may be over emphasized; however, there is some truth in the statement. The time has come for teachers to make a wise discrimination, a wise selection of the subject matter to be presented, and by doing this, much that is not in harmony with the child's environment will be eliminated.

Home economics will substitute in place of this dry subject matter, something of deeper and more vital importance. It will deal with the concrete, with the familiar, with things that can be seen and handled and understood, things that correlate with and influence every day life.

Pupils are familiar, in a general way, with clothing, but very few know the nature of the fabrics from which clothing is made, and why one kind of cloth is better adapted for a special use than another. The same may be said in regard to food. Doubtless very few people could give a definition for good bread, or what is necessary to make milk pure and wholesome. The subject of heating and ventilating is one of vital importance to the school children of Missouri at the present time. Anyone who has visited the crowded school rooms and has noticed the poisonous air, the lack of any means of ventilating, the restless, nervous condition of so many of the pupils, the nervous tension of the teacher. will agree that something should be done at once to remedy these conditions. This subject, it might be claimed, belongs properly to hygiene, but it must be remembered that much of hygiene will be included in the course of Elementary Home Economics when it is once properly arranged.

It may be asked what are some of the things being done at the present time along this line? I am glad to state that a few earnest, capable teachers in the rural schools in Missouri are making a beginning. Their extreme modesty and caution in the undertaking forbids my making their names known at the present time. The work is largely experimental, but they are deeply interested, and are anxious to do something worth while. I can say, however, that some fundamental information is being imparted along the lines of sanitation, decorating the home, selecting suitable wall paper, carpets, furniture, pictures and the arrangement of the same. These teachers are working in the closest co-operation with the homes. The mothers are requested to assist, each one to contribute something, each one to take an interest. Just here permit me to say that one of the greatest difficulties in making this subject most useful and most helpful is the fact that many homes that need this assistance most will not get it. The mothers and fathers in these homes can scarcely be interested in this line of work. No cooperation can be expected from them. However, this should not discourage us, but rather, should inspire us to persevere until something definite has been accomplished. It may be necessary to educate this generation under very great difficulties in order to reach the next one as we should.

A few years ago a gentleman was elbowing his way along a crowded thoroughfare in New York City. He noticed, standing at one of the large windows of an art store, a little, dirty-faced, ragged street Arab. To the man's surprise he was gazing intently at one of the large pictures displayed in the window. It was Rueben's Descent from the Cross. The gentleman asked. ''What is that?'' The street waif replied, ''That's Christ, Sir. Them men are Roman soldiers. They killed him, Sir, they killed him by nailing him to the cross, and now they are taking him down.'' The man walked on. Presently he heard the boy's voice calling to him. ''Say, Mister, say, they killed him, but he arose again the third day. Yes, sir; he arose again the third day.'' The gentleman asked who told all these things about the Christ and His resurrection. the lad replied ''The little lady who teaches our Sunday school class in the mission school at the public market.'' The gentleman wondered as he walked on who was this ministering angel, unknown and unhonored, who had made such a deep and lasting impression upon the heart of this wandering waif on the streets of the great city.

It is this interest that must inspire our teachers to take hold of the girls and boys coming from neglected and indifferent homes, and to lead them to know how to appreciate and to love higher and better things.

A short time since one of the best county superintendents of the State of Missouri spent an evening with a well-to-do farmer. During the visit, the farmer's conversation was concerning his cattle and hogs and the number of acres of land in his possession. The insinuation was clearly understood that teaching was a work of no consequence, that the great body of teachers were, in a measure, failures; that unless a man had accumulated *property* his life was not worth while. I am sure that a great many would censure our farmer friend, but I, for one, do not What is the trouble? Simply this: he did not have that training during the formative years of his boyhood that caused him to appreciate goodness and beauty, and to enjoy pleasure in things that are not wholly material. Teachers should understand, that, with all of their teaching of science and mathematics and history and literature, unless they do something to lift the pupil to a higher spiritual plane, their work in a large measure is a failure.

In the proper study of home economics, the drudgery, the daily toil and moil incident to so much of home life, will be lifted to a higher plain—the work will be educationalized, and instead of hard work it will become intelligent labor.

A few months ago I visited the John Swaney School of Putnam county, Illinois, said to be one of the finest country schools in America. One of the departments that interested me most was domestic science. I will not take time to tell about the course of study outlined, nor the things that were being done. I spent the night in the home of one of the best farmers of that community. I asked the farmer's wife what was the feeling of the ladies of that section toward the introduction of domestic science in that school. Her reply was that it led girls to take a greater interest in home work than ever before, and to see that things were neatly and properly and punctually done. If nothing had been gained in the way of real, substantial knowledge, the habits formed, the inspiration imparted by the teacher would more than justify the introduction and maintenance of the course. Ladies of this convention, please bear this in mind as you strive for the enlargement of this work. The result may not be so evident, may not be in a concrete form, but the inspiration imparted and the spiritual help rendered cannot be understood nor measured by earthly rules and definitions.

THE PROBLEM OF INTRODUCING HOME ECONOMICS INTO SCHOOLS OF SMALL TOWNS.

(By Mrs. C. G. Truitt, Salisbury, Mo.)

Mrs. Truitt.

Several problems arise when we attempt to introduce any new subject into the public schools. Is it of sufficient importance to deserve a place in the course of study? Can space be found on the already overcrowded program? Can the necessary equipment be secured? And, finally, can competent teachers be found for the work?

In a brief way I wish to discuss these four problems with reference to the introduction of Home Economics into the small town schools. To many the importance of this subject is self-evident. If the education is to be a synonym for usefulness, then the schools should stand for preparation. If Home Economics will ''assist pupils to appreciate and control the values of life'' or add to their ''social efficiency,'' it is of considerable importance. And if it can be shown that it is necessary to the accomplishment of this ultimate aim in education, then it should not be omitted.

Again, more than half the pupils in our public schools are girls and the State presumes that each one will be a home maker, then what can be more important than teaching the very thing—which, for the majority of them—will be the most useful acquirement of any kind of school work.

Modern economic conditions make it more and more necessary that arts and crafts be taught in the schools. Much of the work that was once done in the home is now entrusted to hired help. Many things that our mothers assisted in doing when girls were potent factors in their education. Thus what may have seemed drudgery was in reality an apprenticeship to a life of usefulness. Though conditions are rapidly changing in these later years, it is just as necessary today as ever that the mistress of the home know the technique of housekeeping. Indeed, she must be an expert theoretically and experimentally if she wishes to be a successful home maker.

The cry has ever been heard that the program is overcrowded already. This plea was made before many, if not all; our modern cultural studies where introduced, but today the pupil in the first grade can write better, read more intelligently and knows more of numbers than our fathers when they were in the third reader, not to mention the drawing, music, paper cutting, clay modeling, etc., that they knew nothing of at all. It cannot be denied that there is much to be done, but in school, as in life, we must ever find time for the things worth while.

The problem of creating interest can usually be solved without difficulty. The worth of a subject must be known, a need for it must be felt, and an interest will follow as a natural result. The burden of introducing a subject usually falls on the teacher, but often some wide awake woman can arouse enthusiasm, then organize a club of girls, have class meetings, display of work, etc., until finally it will be introduced into the school and eventually become a fixed part of the regular work.

The problem of equipment is not, as a rule, an insurmountable difficulty. The matter of expense may be made nominal. Miss Gertrude Johnson, in her report to Superintendent Greenwood, 1909, gives the sum of $527.13 as the total expense in the equipment of six new schools, or an average of $86 per school. But when no money is available, as is generally the case in small towns, still something can be done. A part of the laboratory or an empty room may be equipped by the pupils. A small amount of expense may be met by giving some kind of an entertainment, charging a small admission and serving a simple luncheon prepared by the pupils.

The work in home economics should not be abandoned for want of equipment. A start should be made with the material at hand. Great enterprises often have very small beginnings.

In the great work of introducing home economics into the small town schools as a subject to be taught to the pupils, we are almost at a standstill. Why? Because the teachers in the schools are not prepared to teach it. Many of the teachers are willing if they only knew how to go at it. How, then, is a teacher to take hold of it when there are mothers who would laugh at her if she would undertake to tell the girls how to cook or sew. One good thing about the teaching of domestic science is that the teacher does not need to know it all when she takes up the subject.

In a town of only a few hundred inhabitants my own experience in introducing home economics met with the best of success. A few girls in the sophomore class of the High School were the nucleus. They had no equipment whatever, and no possibility of getting any from the school board. The boys of the class were already organized into an agricultural club, and the girls were eager to do something along similar lines. I suggested that they meet once a week at the homes of the members and use their own kitchen. Their lessons were based upon those outlined by the department of Home Economics of the State University. As a natural result others became interested and when samples of their work were put on exhibition the parents saw it had been worth while.

From this small beginning there was not the least doubt but what it has proved that the school needed a Home Economics Department, and the establishment of such was the outcome of their efforts.

REPORT OF WOMEN'S INSTITUTE WORK.

(By Miss Ilena Bailey, Farmers' Institute Lecturer, Board of Agriculture.)

Institute meetings to help the farmer get larger returns from the soil and from live stock have been held over the State for seven or eight years. Nothing was done to help the farmer's wife get larger and better returns from her labor until the first institutes for the farm women of Missouri were held in December, 1908. Since that time the following meetings have been held:

Sessions for women	48
Sessions for school girls	18
Sessions for mixed audiences	26
Total	92

The total attendance at these meetings was 6,897, or an average of 75 a session.

Thus far this work has extended only to 22 of the 114 counties of the State. No meetings for women have yet been held in the great southeast section of the State. The majority of these meetings have been held in small towns.

The subjects discussed are as follows: "The Need of Home Economics," "The Convenient Kitchen," "The Bed-room," "The Living Room," "The Attractive Table," "The Cooking of Meat," "Balanced Rations for Men," and "Everyday Sewing." Sometimes the school girls have a real lesson in sewing. They are not taught embroidery work, but how to make a neat patch and a good buttonhole. At some places exhibits of cake, pie, bread and needlework were judged by the institute lecturer. It is hoped more of the school girls will become interested in this work.

Nearly one thousand women in Missouri now receive such bulletins published by the State Board of Agriculture as are of interest to farm women. No effort has been made to make the mailing list large. The aim has been to send the bulletins to those who would read them.

In co-operation with the State Library Commission at Jefferson City, four libraries containing books on home economics and agriculture have been sent out. We hope one of these loan libraries will be placed with every Home Makers' Club, and in many rural schools during the next two years,

Any community desiring an institute for women should write Secretary T. C. Wilson of the State Board of Agriculture, Columbia, Missouri.

OUR OAT CROP—HOW IT MAY BE INCREASED.

(F. H. Demaree, Assistant Professor of Agronomy, University of Missouri, College of Agriculture and Missouri Experiment Station.)

F. H. Demaree.

Although our farmers consider oats their least profitable crop, and are dropping it out of their rotations in many sections, still the yield of oats can be largely increased and the crop made to pay a fair return by proper methods of handling. The sowing of sound, plump seed of the best varieties, better preparation of the soil, drilling instead of broadcasting, and control of smut will accomplish this result.

Oats Have a Place on the Farm.—It is a well known fact that oats are one of the finest feeds known for horses and young stock. The straw, if properly cared for, has considerable feeding value.

Oats, also, fit into our most practical rotations in a way no other crop will do. One of the best rotations for the State as a whole is corn, oats, wheat, clover or cowpeas. In this rotation the land is plowed only two years out of the four, and there is no reason to drop one of the crops at any time, thus upsetting the whole scheme of cropping. On the other hand, where a three course rotation, such as corn, wheat, clover or cowpeas, is adopted, the corn often blows down, which prevents sowing wheat between the rows. The whole crop must then be cut up if the land is put in wheat. This is often objectionable or impossible, so the rotation degenerates into corn two or three years, and wheat and clover when they can be sown. No land will maintain its fertility and yielding power unless properly and systematically rotated.

Missouri Oat Crop in the Past.—For the last seven years Missouri has produced on the average only 709,589 acres of oats yearly. This is far below the corn and wheat acreage. The average yearly yield of oats during this time has been 22.6 bushels, valued at 35 cents per bushel. This makes the average value of an acre of oats only $7.91.

Cost of Production and Profits.—In the annual report of the State Board of Agriculture of Missouri for 1909 is given an estimate on the cost of producing an acre of oats. This has been worked out by a careful farmer and can be considered very accurate. Furthermore, it tallies closely with estimates from other states. The cost given in the report, not including fertility removed from the soil, amounts to $7.56 per acre.

Taking this estimate as typical of Missouri conditions, and comparing cost of production with the value per acre of the crop, it is seen that oat growers are realizing just 35 cents per acre clear profit on their crop. Is it any wonder that many farmers are dropping it out altogether?

Varieties.—The Experiment Station at Columbia has been testing a large number of oat varieties for several years. The object has been to find a variety which will resist the rust, not run out, and maintain its yields.

So far all varieties tested show signs of running out, but some hold up much better than others. Running out is shown in several ways. The oat hulls may remain full and plump, but upon pinching them it is found that there is very little grain inside. The weight per bushel is then considerably reduced. Other varieties do not retain their size but become pointed and sharp, there being a reduction in size of both grain and hull. The weight of such oats remains comparatively heavy, but the yield per acre is reduced. Still another sign of running out is the change in color of the grain. Our black oats do not retain the coal black as is seen in the heavy, plump, black oats in the north, but gradually change to a reddish brown, some of them even becoming nearly white. White oats do not retain the white glistening color of good plump northern oats. They gradually assume a gray color which is prevalent among southern varieties.

The varieties of white oats which have yielded best since 1905 are Siberian, Silvermine, Wide Awake and Great Dakota. The best adapted black oats are Jeanette, Martinsburg, Nichol's Black Comet and Victor. The Kherson is the only yellow oat the station has had under test and it has made a good average yield. The grains of this oat are small as compared with other varieties and do not prepossess a farmer in their favor. However, the Kherson is one of our earliest maturing and most dependable varieties of oats.

The Texas Red Rust Proof, although not showing as high an average yield as some other varieties, is perhaps the best variety to grow in this State on account of its rust resisting power. This was strikingly shown in the season of 1908. When the yields of other varieties were not worth taking, the Red Rust Proof average twenty-seven bushels to the acre. The main objection to this variety is the fact that the kernels have long beards, which cause the grain to must rather freely in the shock and to become dusty and bin-burned when stored. As far as yielding a crop each year is concerned, it is our most dependable variety and runs out least of any that can be grown in Missouri.

During the past two years the Red Rust Proof has averaged 46 bushels per acre. At 35 cents per bushel the gross return from this variety would be $16.10. Subtracting the estimated cost of production, $7.56, this leaves a net profit of $8.54 per acre. This is clearly a much better business proposition than the present state value of oats per acre. How can the farmer increase his yield of oats? This is a most logical question.

Value of Heavy Seed.—Much can be done to prevent any variety from running out. By sowing only plump seed, definite increases in yield can be expected. At the Ontario Station (annual report 1908) an experiment was conducted to determine the differences in yield to be secured by sowing the heavy and light seed of a given variety. For the first three years of the experiment the difference was 10.4 bushels in favor of the heavy seed; the last three years the difference was 22.4 bushels per acre in favor of heavy seed. Furthermore, the difference in weight per bushel increased from 3.2 pounds the first three years to 9.5 pounds the last three years of the experiment. Heavy seed can be obtained from our home grown varieties by fanning the oats thoroughly, saving only large, plump, heavy grain for seed. This is not the general practice. Most farmers go to the bin and shovel out the oats as they come, sowing good and bad alike.

Preparation of the Soil.—The preparation of the ground has much to do with the yield of oats. In most cases it has not been found practical to plow the land, although some stations report increased yields by plowing. Oats generally follow corn, and in that case a good double disking followed by a drag or spike-tooth harrow to level the land should suffice. When the oats are then put in with a disk drill the preparation is most thorough.

Farmers generally sow their oats broadcast with an end-gate seeder on unprepared land, then disk or cultivate with a corn cultivator and smooth down with a drag or harrow. This is not as good practice as drilling.

Drilling vs. Broadcasting.—In experiments conducted at various experiment stations to determine the effect of drilling compared with broadcasting oats, it has been found that a definite increase in yield can be secured by drilling them in. The Illinois station (bulletin 136) found as a general average on three separate fields for three years an increase of 3.9 bushels per acre yearly in favor of drilling. Kansas (bulletin 74) reports a yearly increase of 5.3 bushels for seven years in favor of drilling. Ontario (annual report, 1898), shows that yields have been increased at Guelph 4 bushels per acre yearly for three years by drilling.

These results are conclusive, and definite increases in yield can be expected by a more thorough preparation of the soil and sowing with a drill instead of broadcasting. A disk drill is preferable because it acts as a cultivator and will cover better when running through corn stalks. These increases in yield are probably due to better germination and stronger plants which were produced by having the grain well covered with moist, fine dirt. The root systems of the plants can also become more thoroughly established when the grain is planted to a proper depth.

Amount to Sow.—The yield of oats varies somewhat with the rate of seeding. No definite rule can be laid down as to how much seed to sow. Last season an experiment was conducted at Columbia with Kherson oats along this line. Three rates of seeding were used, eight, ten and twelve pecks—all oats drilled in.

The differences in yield were not large, being about 1.5 bushels in favor of the ten pecks seeding. The weight per bushel and yield of straw increased with the rate of seeding. On the whole, ten pecks seems to be the best amount to sow and will make a good seeding on the average lands of the State. Work done at the Ohio Station (circular 88) corresponds closely to these results. They found that eleven pecks per acre gave best returns. For very fertile soils the rate of seeding can be somewhat reduced and on poor soils increased. A heavier seeding is needed on poorer soils because the plants do not stool well on such lands, and more seed is required to get sufficient stand to give good results.

Time to Sow.—The time of sowing, of course, varies with the season. In general, farmers in South Missouri attempt to get their oats in during the latter part of February and the first of March. The date of seeding gets later going north. In North Missouri oats are put in the last of March and the first two weeks in April on the average. The earlier oats can be seeded in this State the better, because the oat plant makes its best growth and stools best during cool, moist weather. They do not do well when the weather becomes very warm. For this reason early seeding and the use of early maturing varieties is advisable.

Rust.—Red rust is one of the worst enemies of oats in this State. It can be found almost any season but does its greatest damage in a warm, wet spring. In 1908, after such a spring, the oat crop was practically a total failure. No remedy is known other than the use of a rust resisting variety. The Texas Red Rust Proof is the only variety which has given satisfactory evidence of being rust resistant.

Smut.—Aside from the rust, the oat smut is the greatest enemy of the plant. Smut affects the head, reducing grain and all to a black mass. It sometimes attacks the head while still in the boot. In that case the disease is not detected. Loss from smut often amounts to 25 per cent of the total crop. The disease can be controlled by the formalin treatment and the smutted heads reduced to less than 1 per cent. In an experiment at Columbia the yield was increased ten bushels per acre by treating the grain for smut.

The treatment is simple. Prepare a solution by mixing one pound of formalin, 40 per cent strong, with 40 or 50 gallons of water. After fanning the seed oats spread them on a clean floor in a thin layer and sprinkle with the solution until the oats will pack in the hand. Turn them with a shovel until all have been well dampened. Then shovel into a pile and cover with anything handy for two or three hours. The oats should then be scattered and turned from time to time until dry. As soon as dry they are ready to sow or may be left for weeks until they can be used. So far as is known oats so treated are not fit for feed.

SUMMARY.

(1) Up to the present time the oat crop has been regarded as one of minor importance by farmers of the State. The average yield has been so low as to about pay for the cost of production.

(2) The oat crop, however, has a place in Missouri rotations and should not be discarded, as better methods applied to its production will place it on a paying basis.

(3) The best varieties are: White—Siberian, Wide Awake, Silvermine and Great Dakota. Black—Jeanette, Martinsburg, Nichols' Black Comet and Victor. Red—Texas Red Rust Proof. Yellow—Kherson.

(4) Drilling is preferable to broadcasting, and definite increases in yield can be expected if the practice is followed.

(5) The rate of seeding varies with the soil and the size of the seed, but with average conditions ten pecks per acre is about right.

(6) Rust can only be controlled by the use of rust resistant varieties. The Texas Red Rust Proof is the only sort which can be depended upon to resist the rust.

(7) Smut in oats can easily be controlled by the formalin treatment and definite increases in yield secured by so treating seed oats.

(8) General recognition of these factors influencing the yield of oats will aid in placing the production of oats in this State on a paying basis.

ROAD DEMONSTRATIONS.

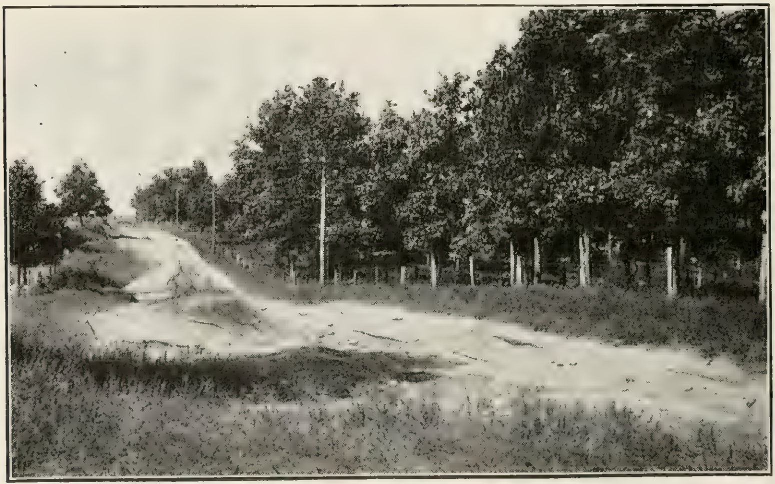
(Curtis Hill, State Highway Engineer.)

Curtis Hill.

During the past year exhibitions at the sessions held by the State Board of Immigration at Springfield and Moberly and one road making demonstration trip over the line of the Frisco railroad from St. Louis across the State by the way of Springfield and Lamar were made. At the Springfield Congress we had a display of plans, photographs, maps and profiles of roads and highway bridges, showing various methods and types of construction and an assortment of road building materials of the State such as clay, sands, cherts, chats, gravels, rocks, oils and tars. In addition to the above display at Springfield, there was shown at Moberly miniatures of earth, sand-clay, rock gravel and oil roads in the different stages of construction and a model illustration of the size of loads possible to be hauled over these different kinds of pavements. Models of metal and concrete culverts and concrete bridge flooring were on exhibit; also an assortment of road plows, scrapers, graders, wagons and rollers. The exhibit of road tools and machinery and models of structures in concrete and metal by this department for two years at the State Fair were creditable, but, as an educational exhibit, should be given a more centrally located section of the grounds and support by the fair officials that it may be made more creditable. Aside from these already mentioned, five or six small demonstrations would complete the list, all of which were only in a small way, for the purpose of illustrating some feature of work adaptable to that particular locality. Two of these demonstrated the use of the drag for maintaining gravel roads, especially upon newly made roads when built without the use of a roller and where the gravel is left to be packed by travel. The following statement relates the success of one of these demonstrations where an old gravel road which had become worn and hollow and the side ditches filled was well crowned and ditched after an hour's work with one team and the road drag:

During a short course in agriculture at the Cape Girardeau Normal, in February, 1909, the State and county highway engineers worked with the school to put on a drag demonstration for earth and gravel roads as a part of the program. There were very few present who had ever seen a drag used upon a gravel road, and the demonstration was given before a skeptical audience. That the demonstration was successful is proven by the following letter received a year later from the county highway engineer of Cape Girardeau county, D. M. Scivally:

''This demonstration aroused a great deal of enthusiasm and we have since been using the drag to maintain not only our earth roads, but also our gravel roads. Where a road roller is not available, as in my county, the gravel is packed by travel, and of course after the road is used a short time there will be three ruts formed by the wheels of vehicles and the hoofs of horses. I have since used a light drag very successfully in filling the ruts and smoothing the newly constructed gravel roads, thereby causing the travel to spread over the entire road. The best results though, have been obtained in case of an old gravel road which had become worn and the center very low. The road had been neglected for a number of years and the extremely dry summers had caused the fine gravel and sand to work to the sides of the road, making a trough for the water. In the first place I took a road grader and pulled in the sides, giving the road a good crown, but in so doing naturally pulled some little clay into the center of the road which afterward proved to be the very thing needed as a binder for the fine gravel and sand. After the first rain the road got somewhat muddy and a great howl went up that the gravel road, the pride of the district, had been destroyed. I had previously made arrangements to have the road dragged when in condition, and after two round trips were made with the drag the road



View "B" before demonstration work at Marshfield, Mo. This section (one-fourth mile) was graveled.

began to pack and in a short time was in fine shape. The road since that time has been kept up with the drag and today is in excellent condition."

The other demonstration, consisting of a string of five cars—one baggage and four flats—left St. Louis September 11, over the Frisco railroad for a trip across the State by way of Springfield and Lamar. It was under the direction of the State Highway Engineer, the machinery being furnished by manufacturing concerns and transported by the Frisco railroad company.

The baggage car was filled with exhibits. Sample roads in miniature, three feet wide, extended along the center and length of the car. These miniatures showed sections of earth, sand-clay, gravel, rock and bitumen roads. All methods of construction shown were adaptable to Missouri. The inner walls of the car were completely covered with plans, profiles and photographs of roads and bridges in the State. In addition the car contained an exhibit of 100 samples of Missouri road building material and also road literature for free distribution.

View "B" after demonstration work. Drained, graded, crowned, rolled, and then graveled and rolled.

One flat car carried a miniature bridge model, 10-foot span, steel riveted structure, designed and detailed in the State Engineer's office and made by Charles Leitch of Moberly, Missouri; two sections of reenforced concrete culverts 21 inches in diameter and two sections 24 inches in diameter, furnished by the St. Joseph Re-enforced Concrete Company of St. Joseph, Missouri; a full set of collapsible cores, 18 to 40 inches, for concrete culvert work, furnished by the Merilet Culvert Core

Company of Kansas City, Missouri; also sections of 12, 15, 18, 21, 24 and 30-inch corrugated culverts, furnished by the Moberly Corrugated Culvert Company. This car carried the small hand tools.

Two flat cars contained the road building machinery of Smith & Sons' Manufacturing Company of Kansas City, Missouri. This machinery consisted of 3 wheel scrapers, 2 drag scrapers, 1 buck scraper, 1 four-ton horse roller, 1 road plow, 3 rooter plows, 1 big and 1 little road grader, 1 road drag and all the double trees, neck yokes and other necessary attachments.

The other car carried a 15-horse power traction engine and a 10-ton steam road roller of the J. I. Case Threshing Machine Company. Each of these concerns sent an expert operator. Curtis Hill and Edward Sheppard of the State Highway Department, C. E. Maggard of the Merilet Culvert Core Company, T. S. McNaul of the Moberly Corrugated Culvert Company, L. W. Long and J. A. Williams of Smith & Sons, and J. E. Lievsay and P. R. Osborn of the J. I. Case Threshing Machine Company comprised the working force.

Beginning of drag demonstration on old gravel road at Cape Girardeau.

All stops were from two to four days, including the unloading of machinery and time spent in actual work. ''Good roads'' lectures were given in the evenings. The section of road to be made in each locality had been previously selected by the local officials, and needless to say, they were representatively bad and difficult in every case. Movement from place to place was made at night, and with fair weather favoring us, we were enabled to adhere strictly to the schedule.

The section of road selected for us at St. Clair was a gently sloping hillside about one-fourth mile in length, composed largely of "chert" (a hard clay cemented gravel which cannot well be plowed with the ordinary plow except in the spring), and a rather shelly limestone outcrop about half way on the hill. The engine and rooter plow were put to work breaking loose the chert, and with the help of hammers, crowbars and picks, also tore up the limestone ledges. By striking the limestone outcrop on the up-grade pull, the point of the rooter plow would catch under a slab of stone. The engine would then be backed to the plow and driven forward with full force of steam. This enabled the engine to strike with the length of the hitch chain and with sufficient power to rip out a large section of the shelly stone. The large grader with traction engine power was used to draw in the loose material. Two men with rock hammers were kept busy walking over the work breaking up the larger pieces of rock and gravel as they appeared on the surface. The light 4-horse grader and 2-horse drag were used to put on the finishing touches and dressing. The whole surface was then completed by rolling.

After drag demonstration at Cape Girardeau.

South Missouri contains considerable soil of this nature and half our work on the trip was of a similar character. The above outlines the methods generally used. This soil itself if properly shaped and worked is, in many instances, a fairly good road building material for country travel. In earth road work no plows were used, but the usual method of earth road work was employed. When necessary to move material along the road any distance our scrapers were brought into play except on one occasion when the haul was about 1,000 feet down a rough hill, when wagons were used.

The people of St. Clair and community showed a good interest in the work, one member of the county court, the State Representative, the county engineer and 15 road overseers being among the spectators. About 300 people witnessed the demonstration. Sixty attended the lecture in the evening when the Good Roads Association of St. Clair was formed.

The section of road selected at Rolla was similar to that at St. Clair, but minus the limestone outcrop, and was worked in the same manner. Less interest was shown in Rolla than at any other stop, possibly a total during the work of 100 people were out on the road and the evening lecture was a failure.

Splendid interest was manifest at Richland, a wide-awake little town, the total attendance being about 500 with 120 at the lecture in the evening. The work was within the town limits which possibly added some to the attendance, but a large number of farmers were present, although none of the county road officials put in an appearance. It was the only place on the trip where the county highway engineer of the county in which we were at work was not with us and helping from start to finish.

Beginning of a demonstration in road making at Ash Grove.

We found a stretch of one-fourth mile of road composed of two chert hills, with a low, boggy place between them, selected for us at Lebanon. The first step was to provide drainage for the boggy ground. Then with the engine, rooters and scrapers we cut the points off of the hills and removed the material to the low ground. When the road was shaped and rolled the appearance and conditions were entirely changed. A concrete culvert 30 inches in diameter and 24 feet long with head walls was also built. The interest was good and although the work was ½ mile out of town the total attendance was 250.

The longest stop of the trip was made at Marshfield, where we met with our first bad weather, although it caused little delay. A shower early Friday morning prevented work until 10 a. m. and left the surface in a slippery condition for the remainder of the day. The wet condition made heavier work and caused the engine and grader to slip and slide so the machinery could not be placed where desired.

Here we had one mile of road set out for us beginning one mile out of town. The first one-fourth mile was the hardest section to work that we found on the trip. It did not look bad, but the one stony point to be graded down together with the rest of the one-fourth mile was a cherty soil, tight and hard, filled with "nigger heads" and flint boulders. It was hard to plow and difficult to move when loosened up. The second one-fourth mile was a nice even stretch of earth.

Interest shown at Ash Grove in the demonstration road work.

The third one-fourth mile was a very rough piece of old road which had been wet and was still full of boggy places, the whole being poorly drained. In times past the holes had been filled with boulders in an irregular way, which resulted in more bog holes and a very crooked alignment. Our plows unearthed about 200 feet of old corduroy road. The rain standing in the low places, together with the bog holes, chunks of rock and corduroy, made it a difficult piece of road to shape up.

The fourth one-fourth of the mile was a long 4 per cent grade with a genuine hard-pan and chert soil. It was not difficult to work, for while hard to plow, only requiring power, it contained few large rocks or boulders, and after loosening with the rooter, was easily handled with the graders.

We found that the county highway engineer here, alive to the situation and determined to make the most of our short stay, had employed an additional traction engine and twenty gravel teams and wagons. The entire mile was staked out 20 feet between centers of ditches. The first one-half mile was graded, crowned, ditched, shaped and rolled complete. The first one-fourth mile was then graveled with an 8-foot center strip of gravel, shouldered and rolled down. The gravel was put on 10 inches thick, loose, on the fills (of which there were two short ones), and 4 inches thick over the chert soil foundation. Some of this chert soil would not need surfacing, but the soil was of a coarse, rough formation and the gravel was fine enough to give it a smooth surface.

View of road demonstration machinery and exhibit on board cars.

The second one-half mile of the one mile selected, owing to the rain on Friday morning, the bog holes, loads of boulders and the corduroy, was ditched and partially shaped and crowned, but left in an unfinished condition from a lack of time. A 40-inch circular concrete culvert 17 feet long with head walls was also constructed. The interest shown here was as intense as in any place on the trip. The total attendance on the work was about 200, but it was sincere. About 70 attended the road meeting and lecture on the last evening in Marshfield.

Rain so interfered at Republic that practically nothing was attempted with machinery other than the road roller. The rain helped the rolling of about 1,000 linear feet of newly made rock road. The citizens of Republic and vicinity are awake to the meaning of good roads, and aside from well-shaped earth roads, have built three miles of good crushed rock road within the past two years and are building and planning a continuation of the work. A similar sentiment was found at Ash Grove where they have one and one-half miles of rock road. We worked one day at Ash Grove, putting 500 feet of rough undrained street into good shape. The county highway engineer and road overseers here had affairs well in hand and we received the readiest, best organized and most efficient assistance at Ash Grove of any place on the trip. Sixty-five attended the lecture in the evening. The Republic and Ash Grove communities do not need road demonstrations and lectures to incite an interest—the interest is already there. They need state aid to help and encourage the work, and they will make the good roads.

The only piece of all-earth road work was met with at Lamar where in one day (by 4 p. m.) we had graded, drained, shaped up and rolled complete one-half mile of an old unworked earth road. A fairly good interest was manifest, the attendance being about 100, although the piece of road was well located for inspection. The lecture and road meeting were dispensed with at Lamar.

With the work completed by four, the machinery could have all been loaded by 5 p. m., but for the only mishap of any kind on the entire trip, which, considering the push and hurry, the loading and unloading and shipping from place to place, is not a bad record. Here all was loaded but the 10-ton steam roller, which was the last piece of machinery to go on board. As it mounted the temporary loading platform everybody stood aside, with a breath of relief that the end had come, when, with the front trucks on the car, the creosoted railroad ties slipped from under the hind trucks and the roller was left standing on end, resting on the fire box with the front roller on the edge of the car. It took till well into the night to get her righted, a new platform erected and the big machine in her place on the car. The remarks made when she went down wouldn't look very well in print. The next morning the baggage car was dismantled, the exhibits boxed, the party disbanded and all shipped in various directions for home and new fields.

Some people wondered why all this trip, the borrowed machinery, the free transportation and the object of the whole trip. The undertaking was a serious matter, hard work and no play. The loaned machinery and promised transportation was necessary simply because the great State of Missouri, so badly in need of better roads, has never supported its highway department with sufficient funds to enable it to undertake any decided progressive educational work of this magnitude and nature and pay its own way. The office must accept the assistance of these houses and machinery, become a beggar for them, or else stand still in its tracks. The main object of the whole trip was to arouse public interest in road improvement. Generally speaking, bad roads prevail because there is not sufficient public interest to build good ones, and the missionary work must continue. At some of the stops the demonstration was to show that to make roads required the right kind of tools. There was no attempt to show the people anything new or strange, but to again call attention to the fact that the only way to make good roads is to get to work and make them. On the whole, the trip was successful. We had expected to meet with "woodpeckers" (knockers), and we found some, but in general our reception was cordial and earnest, and good was accomplished as witness by reports from some of the stops.

Road before demonstration work at Marshfield, Mo.

The newspaper report of the work at St. Clair, Franklin county, says: "The bad piece of road selected for demonstration was ideal in being bad in a great variety of ways and served for an example. Some of the enthusiasm and push were left behind and the St. Clair Good Road Association, which the party helped to organize, has taken up the work, raised a working fund by popular subscription, and we are now conferring with progressive Union citizens with a view of subduing that terror known as 'Moeslein Hill,' the worst on the St. Clair-Union road."

Under date of November 10, Dr. Briegleb, President of the St. Clair Good Roads Association, writes: "The demonstration certainly created an interest here which resulted in a bad piece of road being made good and in more road dragging than ever before. Our local road association, which you organized, has since extended the good work one mile further and along what was before the worst stretch of road in the eight miles between St. Clair and Union, the county seat. The total amount expended to date in continuing the work begun by you is $324.00. The county highway engineer and county court pronounce it to be the most road for the money expended in Franklin county. Flattering comments are also made by others who knew this 'very worst stretch of road' before, and who have seen it since. I for one, and I believe the entire community, are convinced that the demonstration and methods are all right and have given us practical and substantial results."

Road at Marshfield after demonstration but before completion. The water hole at side was afterwards drained from the right of way, and the road surface finished and smoothed.

Under date of December 1, A. E. Campbell, mayor of Richland, wrote as follows: "I give it as my opinion that the road demonstration and the interest you have taken in our community has benefited us. We have done some street work, not a great deal, and have about $4,000 to spend on our streets in the spring. I hear more good roads talk than ever before and I think most of it is due to the demonstration you gave. and I am sure your line of work has helped us in this section. My observation is that the road overseers have done more effective work this season than ever before and a great many of them quote the State Highway Engineer. The improvement in drainage is especially noticeable."

In answer to an inquiry, Mr. Blickensderfer, county highway engineer at Lebanon, answered on November 21, as follows: "The sample good road is all right, and I think has done good. The Lebanon Special Road District has bought a traction engine and rooter plow. You can shake hands with yourself on that alone."

Mr. E. B. Kellerman, road commissioner at Lebanon, writes under date of November 23: "I am satisfied that your demonstration of road work in this county was of a benefit, but it did not reach the farming public as it should. The people of our town who saw the demonstration were pleased and everyone says that is just what we need in this county, but as you know, the great wherewithal stands in our way here in Missouri. Our tax rates are so low it is impossible to raise by taxation what is necessary to make good roads.

"As for our own district, we found that it was out of the question to buy the new improved machinery that we really needed, but we did find a bargain in a second-class engine and rooter. We tested it by an expert and found it to be an excellent puller and we bought it, paying one-third; will pay one-third next year and one-third the year following, so that your demonstration here had the effect of giving us nerve to undertake the purchase of this piece of machinery."

Steel structure with concrete piers across James river, Galena, Mo. State Highway Department, designer; County Highway Engineer, supervisor; Canton Bridge Co., contractor.

The newspaper account at Marshfield, among other things, states: "The good roads train arrived at Marshfield on the evening of September 20, and owing to delay in getting the cars set, did not get unloaded until late the next morning. But when they did get to work they surely did good work. It was an inspiring sight to see this good work and to witness the operation of this road machinery by experienced operators. Part of the road they only graded and rolled, while about one-fourth mile was graded, graveled and rolled, putting this part in first-class condition. A splendid concrete culvert was also built. We think that the good road sentiment will surely be greatly stimulated by their coming.''

Under date of November 7, the county highway engineer, Mr. W. T. Reese, writes: ''Your work has certainly aroused enthusiasm here. It is the best thing we have ever had in this county to arouse interest in the roads. As a direct result I have been able to do $1,000 worth of work more on the road since you were here.'

The newspaper report of the work at Lamar finished with these words: ''The people were out to see the demonstration from early in the morning until late in the afternoon. Many of those who witnessed the work were strong in the belief that Barton county should have a fund of one hundred thousand dollars for good road purposes. This amount of money judiciously expended on the roads of Barton county would increase the value of the county at least one million dollars. Public improvement sentiment comes slow but in time it will enter into control, and then we will see things that we never saw before.''

1,140 feet of bridge across the Current river at Van Buren, Mo. State Highway Department, designer; County Highway Engineer, supervisor; Missouri Bridge and Iron Co., contractor.

The cost of good roads in that section of the State through which we passed from St. Louis county to Greene county is comparatively small. The prevailing chert hills and banks and the hard nature of some of the soil makes necessarily a high initial cost in comparison with earth road making of the more alluvial and prairie soil sections, but the final cost to obtain a good firm road is much less. Dr. Briegleb mentions the cost of extending our work one mile to be $324 and which made a good natural country road. Considering the abundance of gravel and the very thin coating necessary on many parts of the road, they can be graveled with 9 feet of metal for $700, bringing the total cost to about $1,000. This is small when compared with other places in the State that are paying three times that amount for roads with 9 feet of metal.

The cost of the work at Marshfield was practically the same as that at St. Clair. The cost for the mile of work was $192 for everything complete, except that furnished by the State Engineer. The remainder may be itemized as follows:

Steam roller, 4 days @..........	$10.00	$40.00
2 engines, 4 days @.............	20.00	80.00
2 graders, 4 days @............	10.00	40.00
Other implements, 4 days @......	5.00	20.00
7 men, 4 days @................	25.00	100.00
		$280.00

View of Cass county rock road near Belton, Mo.

These items, $192 and $280, includes graveling the one-fourth mile section the hauling of which gravel amounted to about $170 of the $192. This would make the grading and shaping $300 and graveling $700 per mile for 8 feet of gravel. This includes the $40 item for rolling (which is not always practical under the existing conditions), work done with a rush, time consumed in loading and unloading and an unorganized force. It is safe to assume that with a regular organized force these roads can be made good serviceable roads of the natural material for $300 per mile. Gravel being within a reasonable haul and by graveling the less good portions and utilizing the natural "chert" beds and banks, 9-foot roads can be made for $1,000 to $1,200 per mile. Good roads of standard width (15 feet of metal) will cost $1,400 to $1,600 per mile. This includes only such grading necessary to crowning and side ditching. The cost for any heavy grading and cutting down the hills must be additional.

I have perhaps gone more into the details than work of this nature would warrant, but I have long believed that demonstrations, as a means of education and stimulus to road work and public interest, are well worth the cost. Demonstrations concentrate thought and words into action and get something more than talk. All my demonstrations except the Frisco trip were necessarily on a small scale, and while each one showed results, they were only in proportion to the magnitude of the work and were not of enough magnitude to attract attention nor to be convincing of their real value. This trip was put through for the express purpose of illustrating that more good can be accomplished by the State Highway Engineer by demonstration work than in any other way. It is to show this especially that so many of the testimonials are used in reporting the work. It does seem to me that the few small demonstrations, together with this one railroad trip, should convince anybody that, in addition to the expense of running the office, the State Highway Engineer should be supplied with money for road demonstration and experimental work.

TESTING FARM SEEDS IN THE HOME AND IN THE RURAL SCHOOL.

(By F. H. Hillman, Assistant Botanist, Seed Laboratory, Bureau of Plant Industry, United States Department of Agriculture. Reprinted from Farmers' Bulletin 428, issued February 13, 1911.)

INTRODUCTION.

Progressive farmers who recognize the importance of better and more profitable crop production are becoming convinced that the quality of the seed used is worthy of careful attention.

The results of seed tests made at the Department of Agriculture and at the State Experiment Stations show that certain kinds of farm seeds in which there is an active trade and a strong competition are often seriously adulterated, the effect being that the farmer buying such seed gains a disappointing experience instead of a satisfactory crop. Again, the seed of certain farm crops is often mixed with seed of especially noxious weeds, necessitating labor and expense in preventing permanent injury to the farm. Seed may have a low germinating power, due to age or to unfavorable conditions of development or of harvesting. Seed of clovers and of alfalfa found on the market sometimes comes from foreign regions possessing a less rigorous climate than that under which the seed would be grown in this country. For this reason such seed is undesirable. These results of tests made in the laboratory are fully corroborated by the experiences of farmers engaged in growing crops.

The popular agitation within recent years in the interest of better seed has brought about some change in trade conditions, but much room for improvement still remains. While a few states now have laws pertaining to poor seed, there is no Federal law preventing the importation of poor seed or its distribution by interstate traffic. In consequence of this, protection in seed buying is very largely a matter of business acumen on the part of the individual purchaser, which becomes very important when the purchaser is also the consumer.

In the matter of seed buying, the best protection to the purchaser is believed to be self-protection based on the ability to judge the quality of the seed offered. This belief is supported by the fact that it is both possible and practicable for buyers or consumers of seeds to determine very accurately their quality.

The purpose of this bulletin is to encourage seed testing in the farm home and in the rural school by explaining the essential features of seed testing as it relates to farm seeds and by showing how satisfactory tests can be made by simple means. The expense involved is slight and, considering the little effort and time required, is thoroughly justified by the practical information to be gained. The writer's observation of the readiness with which beginners have qualified themselves for making such tests under instruction scarcely more favorable than that offered here, satisfies him of the absence of any valid reason why farmers should not protect themselves from the use of poor seed.

An important advantage of making tests at home is that the time required to get a report on a sample of seed sent to Washington or to an experiment station for test is saved. This obstacle removed, a practical examination or test will often be made, when if the seed must be sent away it will be bought untested. Furthermore, a purchaser's order from sample is much more likely to be filled from the seed actually represented by the sample if the delay in sending away for a test report is avoided.

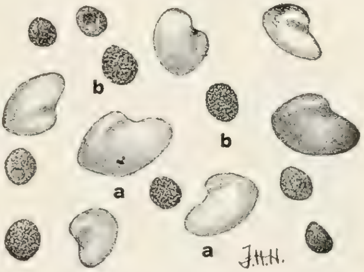


FIG. 1.—Seeds of clover dodder (**b**) and red clover (**a**), showing relative sizes. (Enlarged.)

Seed testing is admirably adapted for practical exercise work in rural schools giving instruction in elementary agriculture. It is easily carried on at any season of the year and requires but little outlay for apparatus or working material. If tests are made of seed of interest at the time in the homes of the pupils, the results may be of very practical service. A study of farm seeds and their impurities tends to interest pupils in crops and weeds and in their interrelation on the farm.

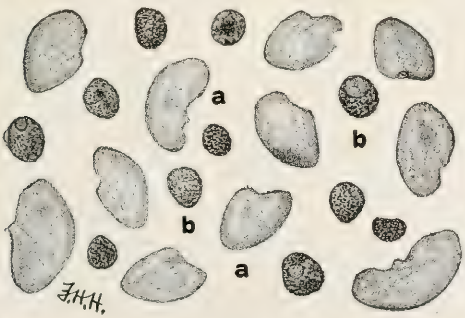


FIG. 2.—Seeds of clover dodder (**b**) and alfalfa (**a**), showing relative sizes. (Enlarged.)

SEED TRADE CONDITIONS.

GENERAL STATEMENT.

Most of the undesirable conditions exhibited by seed which make seed testing necessary are the result of trade influences. The responsibility for these conditions doubtless rests fully as much with the mass of consumers who demand low-priced seed as with the dealers who cater to this demand. The trade has employed various means to meet the demand for low-priced seed. Large importations are made of the same kinds of seed which are produced in and are exported from this country. The imported seed can be sold cheaper than that which is exported. Grades of seed which are practically unsalable in Europe find a ready market here because the better American-grown seed is commonly considered too high-priced. Various forms of seed adulteration have long been practiced, and seed ill adapted to our climatic conditions has often been sold. The results have been frequent failure of crops, an excessive cost of the actually good seed, and a wider distribution of many kinds of foreign weeds than by any other means. A general understanding of these conditions as they relate to particular kinds of seeds is helpful in making tests.

APPLICATION TO KINDS OF SEEDS.

Red Clover and Alfalfa.—Seed of both red clover and alfalfa is imported, chiefly from Europe, in large quantities annually, and much of it is low in quality. Such low-grade seed is usually very weedy. The imported red clover seed is often a grade of small-seeded screenings which carries a class of weed seeds rarely found in a large-seeded grade of clover seed. Such low-grade seed carries seed of clover dodder in nearly every instance, while American-grown clover seed practically never carries this kind of dodder seed. (See fig. 1.) Shriveled alfalfa seed screenings containing very little, if any, good seed are sometimes imported. Such material can serve only as an adulterant. Cheap imported alfalfa seed usually carries clover dodder, while American seed is free from it. (See fig. 2.) Again, buckhorn, wild carrot and wild chicory seeds are nearly always found in the cheap alfalfa seed from Europe, while they do not appear in most lots of American seed. Both red clover seed and alfalfa seed are subject to adulteration with yellow trefoil seed. (See figs. 3 and 4.) Alfalfa seed, furthermore, is adulterated with sweet clover seed (fig. 5) and with seed of the bur clovers.

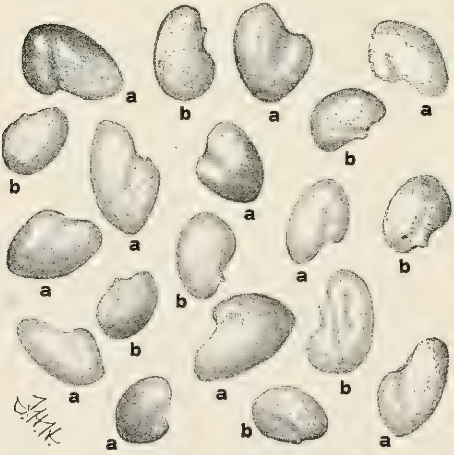


FIG. 3.—Mixture of seeds of red clover (**a**) and yellow trefoil (**b**). The clover seeds are more or less triangular, those of trefoil oval, and usually with a distinct projection beside the scar notch. (Enlarged.)

(See fig. 6.) Seed of red clover, alfalfa, and crimson clover from the warmer parts of Europe is from a tenderer strain of plants than is demanded in most parts of this country. Experiments have shown that, as a rule, such seed can not compete in crop production with domestic seed.

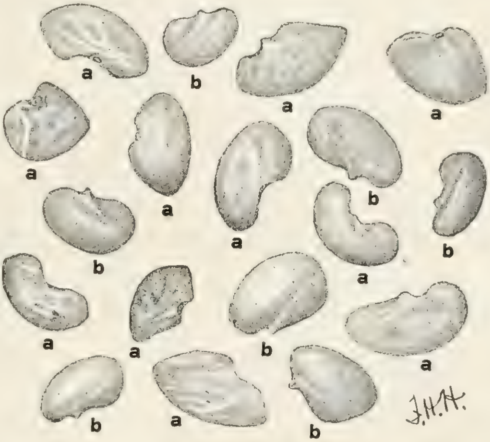


FIG. 4.—Mixture of seeds of alfalfa (**a**) and yellow trefoil (**b**). Alfalfa seeds are more or less kidney-shaped or angular, while those of trefoil are more uniformly oval and have the small projection at the scar more commonly evident. (Enlarged.)

Considerable red clover seed has been imported from Chile within recent years. This seed is the best appearing clover seed in our market, and authentic reports show that it has proved productive in various localities extending from Canada nearly to the Gulf States. Nearly every lot of this seed that has come under our observation, however, has been badly infested with an unusually destructive strain of field dodder seed (fig. 7).

Alsike Clover.—Seed of alsike clover is produced in the Northern States, but much of that in the market is imported from Canada. Very little is imported from Europe. Canadian seed, and doubtless some of that produced in the United States, often contains much Canada thistle seed—more, indeed, than is found in any other kind of farm seed. Yellow trefoil seed commonly appears in alsike seed, sometimes to the extent of severe adulteration. Low-grade, weedy and shrivelel screenings are sometimes used as an adulterant. (See fig. 8.)

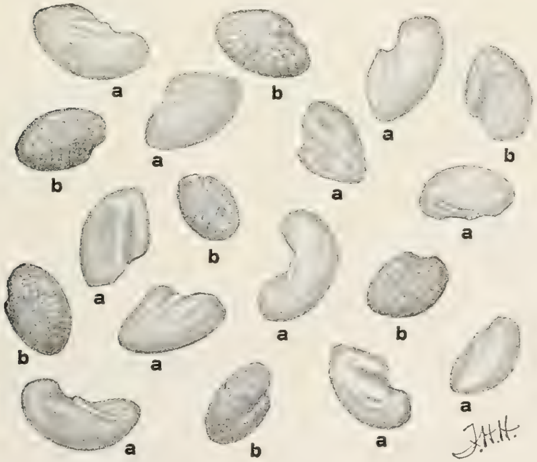


FIG. 5.—Mixture of seeds of alfalfa (**a**) and sweet clover (**b**). The elliptical form of the sweet clover seeds, which have the scar notch near one end, together with their uneven surfaces, serves to distinguish them from the more nearly kidney-shaped and smoother alfalfa seeds. (Enlarged.)

Several of the commoner kinds of weed seeds found in alsike clover seed very detrimental. Some lots of alsike seed consist largely of timothy, ich amounts to an adulterant if the mixture is sold at the price of pure alsike seed. This mixture is poor seed to sow if alsike seed production is contemplated; the two crops ripen together and their seed can not be wholly separated.

Old stocks of seed of the clovers and of alfalfa having low vitality are often mixed with new seed. Such seed is sometimes oiled and rubbed to give it the appearance of freshness.

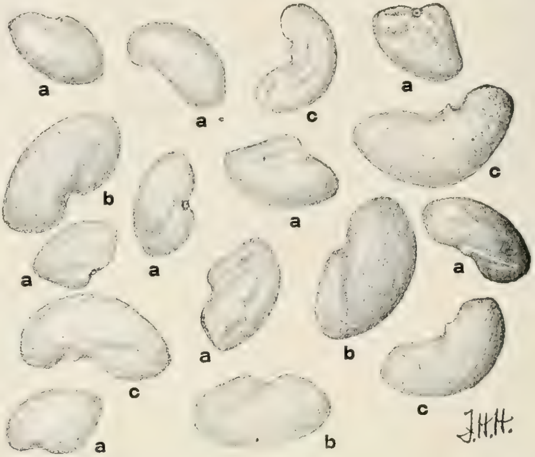


FIG. 6.—Mixture of seeds of alfalfa (**a**), toothed bur clover (**b**), and spotted bur clover (**c**). Note the larger size of the bur clover seeds, also the kidney shape of the spotted bur clover seeds, which have the scar near the smaller end. (Enlarged.)

Grass Seeds. — The seeds of grasses are subject to various conditions tending to reduce their quality. Adulteration with old seed or chaff of the same kind or with the very similar appearing seeds of other kinds is often practiced and readily escapes detection by both retail dealers and consumers. Accidental misbranding of grass seed in the trade is doubtless not uncommon.

Kentucky bluegrass seed is often adulterated with the similar Can-da bluegrass seed or seed of the latter is substituted for the former. See fig. 9.) Again, Kentucky bluegrass seed often has low germinating power, owing to improper methods employed in curing, and it is commonly very chaffy.

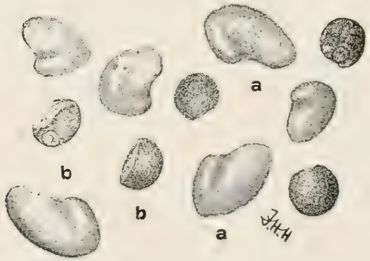


FIG. 7.—Seeds of field dodder (**b**) and red clover (**a**), showing relative sizes. (Enlarged.)

Orchard grass seed is adulterated with seed of meadow fescue, English rye-grass, or with both. (See fig. 10.)

Seed of meadow fescue, or English bluegrass, is adulterated with seed of the perennial, or English, rye-grass and with orchard grass chaff. (See fig. 10.)

Awnless (or Hungarian) brome-grass (*Bromus inermis*) seed is adulterated with meadow fescue and English rye-grass seeds and with chess, or cheat. (See fig. 11.) The latter has even passed in the trade as Hungarian brome seed.

Redtop seed appears in the market in three grades, "recleaned" (or "solid"), "unhulled" and "chaff" redtop. The latter is very misleading, since it sometimes contains practically no good seed. The recleaned grade sometimes contains considerable timothy, which is inexcusable unless sold as mixed redtop and timothy.

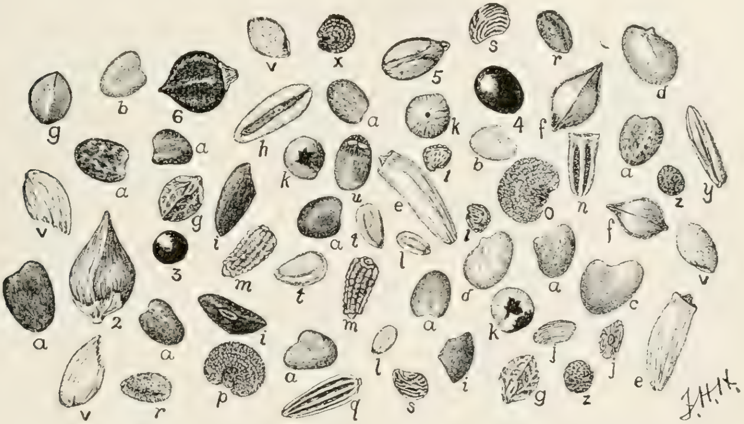


FIG. 8.—Mixture of weed seeds commonly found in low-grade alsike clover seed: **a**, Alsike clover; **b**, white clover; **c**, red clover; **d**, yellow trefoil; **e**, Canada thistle; **f**, dock; **g**, sorrel; **h**, buckhorn; **i**, rat-tail plantain; **k**, lamb's-quarters; **l**, shepherd's-purse; **m**, mayweed; **n**, scentless camomile; **o**, white campion; **p**, night-flowering catch-fly; **q**, oxeye daisy; **r**, small-fruited false flax; **s**, cinquefoil; **t**, two kinds of peppergrass; **u**, catnip; **v**, timothy; **x**, chickweed; **y**, Canada bluegrass; **z**, clover dodder; **1**, mouse-ear chickweed; **2**, knot-grass; **3**, tumbling amaranth; **4**, rough amaranth; **5**, heal all; **6**, lady's-thumb. (Enlarged.)

Rape, Vetch and Flax.—Winter rape seed is liable to contain seed of the summer rape (bird rape), an annual variety of rape not adapted to the forage purposes of the winter rape. Seed of either winter rape or summer rape may contain the seed of various wild mustards, especially that of English mustard, or wild charlock. (See fig. 17, *t*.)

Winter (or hairy) vetch seed often contains seed of various varietie of spring vetch, from which it should be free.

Considerable flax seed is imported from Russia mixed with man impurities, including seed of the flax dodder, a kind of dodder particularly destructive to flax. (See fig. 12.) Seed from certain regions of production in this country is free from this dodder, false flax seed and other impurities.

APPRECIATION OF GOOD SEED NECESSARY.

These and other conditions of the seed trade operating against the use of the best seed have long prevailed in this country. They are likely to continue, largely irrespective of laws to the contrary, until consumers generally come to appreciate and accept only good seed. Consumers will need to know good seed from poor and to understand that the legitimate price of good seed is actually lower than the corresponding price of poor seed which costs relatively more to market, although the original cost to the dealer may be lower than that of high-grade seed.

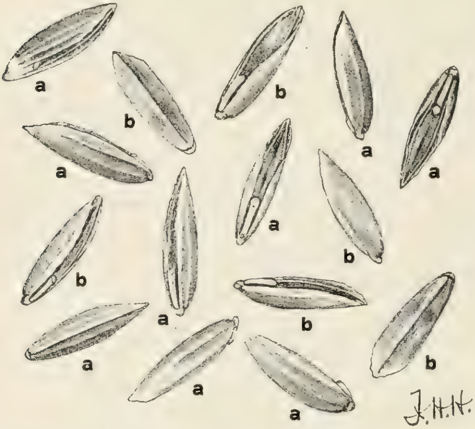


FIG. 9.—Mixture of seeds of Kentucky bluegrass (**a**) and Canada bluegrass (**b**). The Kentucky bluegrass seeds are broadest at the center, pointed, and have a distinct ridge on each side. Canada bluegrass seeds are mostly broadest near one end, blunt, and smooth on the sides. (Enlarged.)

PURPOSE OF SEED TESTS.

The purpose of making tests of farm seed is to detect the undesirable conditions affecting the seed which have been referred to in preceding paragraphs. Such tests should be made early enough in the season to allow ample time to obtain other samples or to buy additional seed if the tests

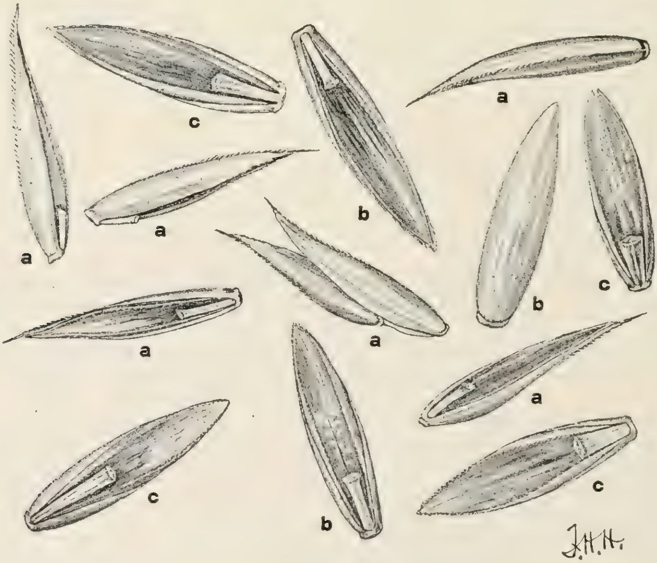


FIG. 10.—Mixture of seeds of orchard grass (**a**), meadow fescue (**b**), and English rye-grass (**c**), The orchard grass seeds are distinguished from the others by their slender, curved form. The meadow fescue and rye-grass seeds are distinguished by the difference in the section of the seed-cluster axis (rachilla segment) which each bears. (Enlarged.)

lead merely to providing for foreign matter by sowing a larger quantity of seed.

The seed of most of the farm crops can be recognized with certainty under careful examination as to its particular kind. Seed of different varieties of a kind as a rule can not be distinguished in this way. For example, red clover seed can be distinguished from other seeds, but the medium and mammoth varieties of red clover can not be distinguished by their seeds.

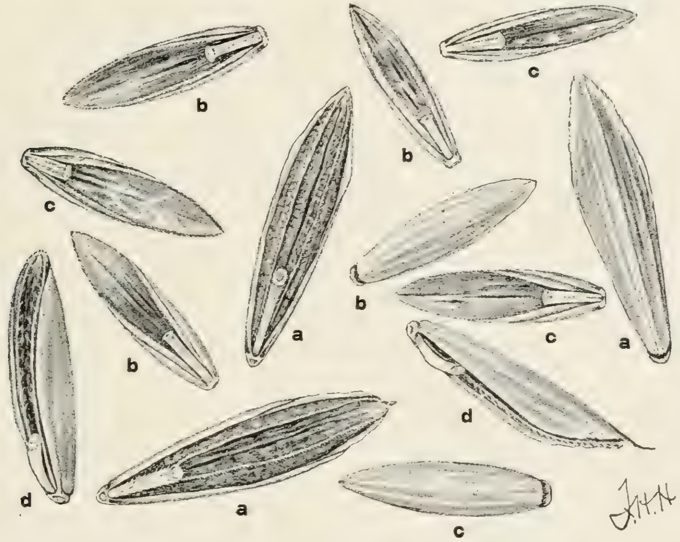


FIG. 11.—Mixture of seeds of awnless brome-grass (**a**), meadow fescue (**b**), English rye-grass (**c**), and chess, or cheat (**d**). The brome-grass seeds are distinguished by their greater length and flattened form. The seeds of chess (**d**) are somewhat cylindrical, due to being folded lengthwise. They are thus thicker than the awnless brome-grass seed and sometimes are awned. (Enlarged.)

Seeds of varieties of individual kinds of plants usually must be grown to insure varietal determination. This is not a part of the usual seed test.

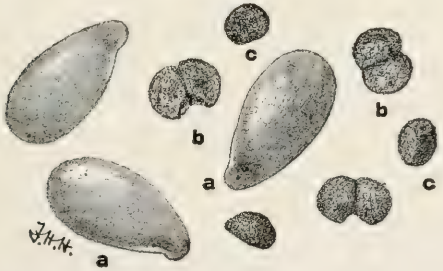


FIG. 12.—Seeds of flax dodder (**b** double, **c** single) and of flax (**a**), showing relative sizes. (Enlarged.)

The first object of the test, excepting with respect to varieties, is to find out if the seed is true to name.

The seed of certain farm crops is rarely free from all impurities. Miscellaneous impurities may appear or some one kind of foreign seed may be present as an adulterant. Old seed of the same kind as the crop seed may constitute an adulterant, a fact which becomes apparent in the germination test.

A second object of the test is to show if the seed has been intentionally adulterated.

The miscellaneous impurities of seeds are classified (1) as inert material incapable of growing, and (2) as foreign seed which may be capable of growing and producing plants.

A third object of the test is to show the relative proportions of comparatively harmless inert material and of possibly noxious foreign seed in the sample.

The foreign seeds in a sample, consisting usually of various kinds of weed seeds, may not amount to much in quantity, but their noxious character may make them very important.

A fourth object of the test is to disclose the presence of especially noxious weed seeds, as dodder, dock, thistle, etc.

A fifth object of the test of seeds in which the region of production is a matter of importance is to show, if possible, by the nature of its impurities, the probable source of the seed or to show if it is a mixture of domestic and foreign-grown seed.

A sixth object is found in the germination test, showing how much of the seed is capable of growing under favorable conditions. The energy with which the seed sprouts is to be considered. With new clover and alfalfa seed the amount of ''hard seed,'' or seed which absorbs moisture slowly and therefore sprouts tardily, is to be noted and allowed for in using the seed.

The objects thus enumerated relate particularly to the seed of miscellaneous forage crops. Interest in the seed of the cereals and corn centers chiefly in the germination test with respect to the extent and character of the sprouting.

SEEDS ESPECIALLY NEEDING TO BE TESTED.

While all kinds of farm seeds may be subjected to a test of one kind or another, the seeds of the crops in most general use and which it is especially desirable to have tested represent the true clovers (as red, alsike and crimson), alfalfa, certain grasses (as timothy, orchard grass, fescue grass, bluegrass, brome-grass and the millets), cereals, rape, flax, vetch and corn. The reason for this selection is that much of the seed of the crops enumerated, except cereals and corn, is imported, and widely variable grades are on the market. The magnitude of the trade in this class of seeds shows that the majority of farmers do not depend on domestic production for the seed they use. It is probable that the prevalence of foreign-grown seed in the market is not generally recognized by farmers in localities where locally grown seed is ordinarily used.

EASE OF MAKING PRACTICAL TESTS.

Seed tests sufficiently accurate to answer all practical purposes can be made by a beginner with a little practice. Certain time-consuming and exacting features of detail in making official tests at Washington or at an experiment station are often unnecessary in making tests for the facts of most practical importance.

By providing the apparatus and following the directions for making tests suggested in the following pages and by using the illustrations in comparing seeds of different kinds one can soon become sufficiently expert to feel reasonable confidence in his ability to avoid errors of importance.

The younger members of the home circle should find such work comparatively easy to accomplish and interesting as well. The testing of locally grown seed would be assisted by the possession of a correctly named set of the seeds of crops and of weeds prevailing in the vicinity.

When the work is done in the school, samples of seed of local interest and obtainable at the homes of the pupils may be used. This tends to impress the pupils (and their parents as well) with the immediate utility of the work. If suitable seed is not obtainable locally, samples representing different grades can be obtained from dealers. The boys can make the balance here described. Several balances may be made and their efficiency compared. The successful making of such apparatus has a distinct educational value of its own. One pupil may be authorized to procure the magnifiers required; another may be delegated to provide one or more plate germinators or to make the corn-germinating box. Germination tests made in cloth, paper, sand and soil may be compared, showing the effect of surrounding conditions. Such actual practice makes the pupil do and think and fits him to master corresponding but more complex problems later.

APPARATUS USED IN MAKING TESTS.

The Need of Apparatus.—Only such apparatus is needed in making practical seed tests as enables one to use a weighed quantity of seed from the sample, to separate the pure seed from the foreign seeds and other impurities, to distinguish the character of the foreign seeds, and to make the germination test.

It is important to use a weighed quantity of seed in the test, because only in this way can one determine the relative quantity or percentage of pure seed as compared with the quantity of the impurities. This requires a balance sufficiently sensitive to be moved by a small weight, such as that of a few clover seeds. This sensitiveness is necessary, because only a small sample of seed can be used in the test. A large sample would require too much time and labor. For this reason only small samples are used in making official tests of seeds.

The absence heretofore of a readily available, effective balance suited to this work doubtless has been the chief bar to the popularizing of farm and rural-school seed testing. Expensive chemical balances are used in making official tests, and the cheaper balances on the market cost from $10 to $35—an expense beyond the reach of the mass of consumers who should profit by practical seed tests.

The Balance.—A simple, efficient balance can be made by any boy or girl at all familiar with the use of a few common tools. The general

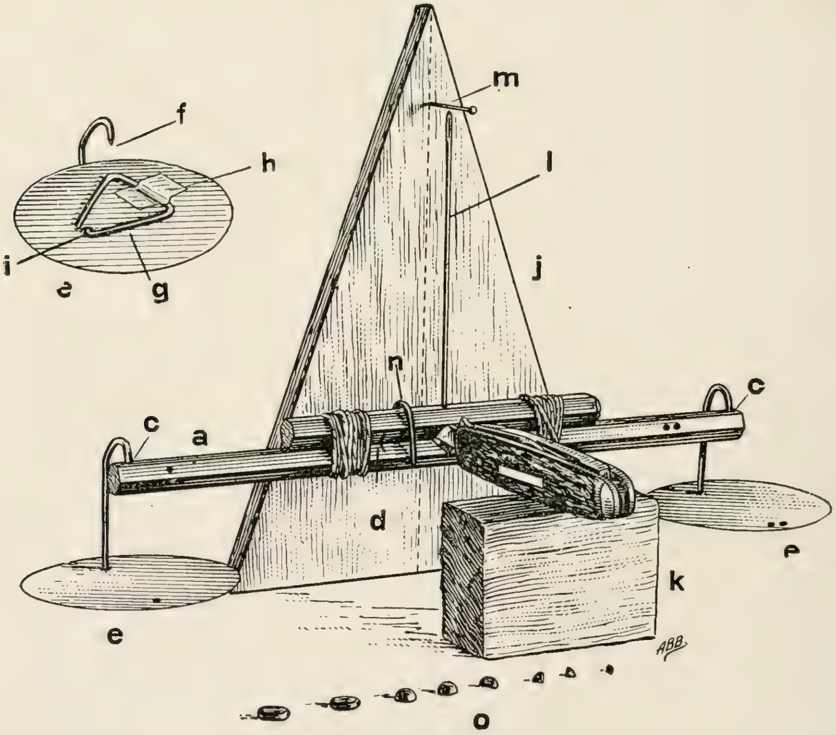


FIG. 13.—A simple balance used in making the purity test of seeds: **a**, Six-sided pencil, full length, and a half-length pencil bound to the long pencil by rubber bands; **c**, shallow holes near the ends of the long pencil; **d**, reference mark common to both pencils at a convenient point on the line where they meet; **e**, trays for holding the seed and the weights, the upper one showing the under side; **f**, bluntly pointed end of the wire adapted to fit loosely in one of the holes (**c**); **g**, wire bent beneath the tray to hold it in position; **h**, piece of gummed paper holding the wire to the tray; **i**, hole at proper distance from the center of the tray where the wire pierces it; **j**, thin piece of board holding the parts of the balance in position; **k**, the block of wood holding the knife handle at proper level; **l**, darning needle serving as a pointer as the pencils oscillate in weighing; **m**, pin marking the position of the head of the needle when the trays are properly balanced before and at the close of weighing; **n**, "rider," or wire staple, so placed as to balance the trays when empty; **o**, series of selected BB shots used as weights; whole ones are flattened to prevent rolling; others are cut into halves, quarters, eighths, and sixteenths, and selected with reference to the equality of their weights.

construction is clearly shown in figure 13, to which the letters used in the following description refer:

The balance consists of a hexagonal, or six-sided, pencil (a) notched as nearly as possible in the center and halfway through the lead. Make a rather wide V-shaped notch. Half of a similar pencil is notched likewise at its center, care being taken that the angle at the apex or "bottom" of the notch is made narrow, straight and smooth. At this point the balance rests on the small blade of a knife, as shown in the figure. The blade must not bind and the pencils must swing on its edge with the least possible friction. The two pencils are firmly rubber-banded together so that the two notches form an opening nearly square between the pencils. Near each end of the long pencil and on its notched side make a shallow hole (c) by boring into the wood with a hard pencil having a smooth, slightly blunt point. In order that the balance may operate properly the apex of the notch in the short pencil—that is, the point which rests on the knife-edge—must be exactly midway between the holes in the ends of the long pencil. Slide the short pencil along the other till it is in proper position, then with the point of the knife-blade cut a mark (d) common to both pencils on the line where they touch. The rubber bands should prevent the pencils from slipping when in use, but the mark will show if they do slip. Two similar trays (e) are hung from the ends of a long pencil. They consist of circular pieces of stiffish cardboard about 2 inches in diameter, suspended by means of wires curved in fishhook form, the points of the hooks resting within the holes (c) previously made in the pencil ends. The points of the hooks (f) are bluntly and smoothly pointed, so as not to bind in the holes. Beneath the trays the wires (g) are bent to hold the trays in level position, and are held to the tray by pieces of gummed paper (h). The illustration shows the trays as flat pieces of cardboard. It is better to cut the trays from the edge to the center, then lap the two cut edges and glue them fast, thus making a shallow dish. The wire (g) beneath the tray is then preferably bent in circular form. Balancing the tray hook on the finger shows the proper bending of the wire where it pierces the cardboard (i) to make the tray hang level. A triangular piece of thin board (j), as a cigar-box cover, serves to hold the knife blade in position. A block (k) holds the knife handle. The knife is set high enough to permit the trays to hang about one-half inch above the surface on which the balance rests. For the purpose of showing slight movements of the balance in exact weighing, a darning needle (l) is set in the top of the short pencil directly over the knife-edge and at right angles to the pencil. A pin (m) is placed in the board directly over the point where the knife point pierces it, and just above the end of the needle. When the device is properly balanced the end of the needle will stand at rest directly under the pin. It probably will not balance until a staple of wire (n) is placed over the pencils in proper position on one side of the knife blade or on the other as a counterweight. This completes the construction, and when properly mounted the balance should oscillate freely by the slightest touch. As the trays are likely to be interchanged in use it is advisable to mark each, placing corresponding marks on the ends of the pencil at which the trays preferably belong.

In making seed tests we may use common BB shot (whole and fractional) for weights. This is because we wish to know only the comparative weights of the pure seed and of the foreign seed and other impurities in the sample. Thus, if we test an amount of seed, balancing ten shots, and find that the weed seeds it contains just balance one shot, it is evident that one-tenth of the original seed, or 10 per cent, consists of impurities. In other words, 90 per cent (or 90 pounds of each 100 pounds) of the original seed is pure seed. In using a balance so sensitive as the one described a single BB shot is too heavy for use as the lightest weight. We need a weight to be balanced by only a few clover seeds at most. Very small shot is troublesome to handle and count, so we use the larger BB shot, flattening the whole ones to prevent them from rolling, and cutting some into halves, quarters, eighths and sixteenths. By careful selection according to weight a fairly uniform series (o) of whole and fractional shots can be provided. Now, the weight of one-sixteenth shot is 1 per cent of the weight of 6¼ shots, because 6¼ equals 100÷16. So if we test a sample of seed balancing 6¼ shots any impurity balancing the $^1/_{16}$-shot weight represents 1 per cent of the sample tested. If the sample is twice as heavy, balancing 12½ shot, the $^1/_{16}$-shot weight represents one-half of 1 per cent of the whole.

It is evident, therefore, that the means described enables one to determine the quantity of pure seed or of impurities in a sample to within 1 per cent, or even one-half of 1 per cent of the true quantity. This is sufficiently close for the practical seed testing under discussion.

The Forceps.—A pair of forceps is very useful in picking up the small weights used with the balance, also individual seeds. Suitable forceps may be made of two thin pieces of hickory wood separated by a piece of wood to which one end of each piece is fastened. The free ends are flattened and pointed. A piece of spring wire bent in U shape and having flattened and pointed ends serves very well as forceps.

The Magnifiers.—After the seed to be tested has been properly weighed it is to be separated into pure seed and foreign seed or other impurities. This requires a magnifier. Very coarse seed—such as that of wheat, oats, flax, etc.—can usually be examined by the aid of an ordinary reading glass, which is to be found in many homes or can be bought at a cost of $1 to $2. Clover seed, alfalfa seed and the grass seeds require a magnifier of higher power. A very satisfactory magnifier of this kind is the tripod magnifier, shown in figure 14. With it one can distinguish all the kinds of crop seeds and practically all the different kinds of adulterants and weed seeds. This magnifier is sold by opticians, stationers and druggists generally throughout the country at prices ranging from 50 to 75 cents.

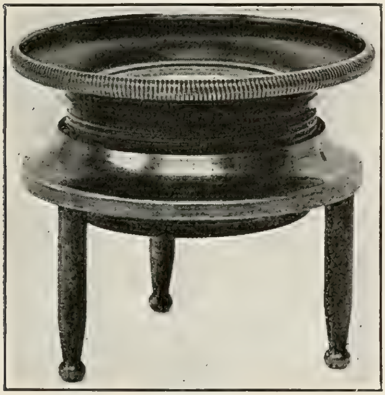


FIG. 14.—Magnifying glass.

The Paper Tray.—Seed is examined best over white paper, and in order to prevent the loss of seed from a weighed sample, a paper tray is useful. Such a tray is made from stiffish white paper, as a sheet of heavy letter paper. The edges of the sheet on all four sides should be folded over, making a rim one-fourth inch wide. Folding the edges over the straight angular edge of some convenient object largely prevents the paper from warping and makes it easier to use. Cutting off one corner permits the seed to be poured easily from the tray.

The Germinator.—Figure 15, showing the simple plate germinator, is self-explanatory. Either blotting paper or cloth may be used to receive the seed. Clean sand may be preferable for some kinds of seed. A germinator of this description is most useful in testing forage-crop seeds or seeds of cereals. In testing corn the sand-box method, described in Farmers' Bulletin 409, entitled ''School Lessons on Corn,'' is very satisfactory, or the cloth method may be employed. This method makes use of a box of convenient size, say 20 inches square, interior dimensions, and 2 or 3 inches deep. The seed is placed on white cloth, preferably Canton flannel, which is cross-marked on the smooth side with distinct pencil lines in 2-inch squares. The required moisture is held by extra thicknesses of cloth or by clean sand beneath the cloth, forming a layer about an inch thick over the bottom of the box. If Canton flannel (which comes 27 inches wide) is to be used instead of sand, the box may be made narrower than suggested, say 12 inches, thus allowing for folding the cloth and for shrinkage.

DISTINGUISHING CHARACTERS OF SEEDS.

Safeguarding Against Deception.—One of the first steps in testing seeds of the forage crops is to determine if the sample is true to name, and it is necessary that these kinds of seeds be recognized with certainty. While most farmers, as a rule, can recognize red clover seed, for example, when they see it in bulk, it is not so certain that they would recognize individual seeds of red clover under all conditions, as one must in making tests of this seed. Again, alfalfa seed in bulk is recognized by most farmers, because they contrast it with red, alsike, and white clover seed with which they are familiar as these seeds appear in bulk. It is a question, however, if the average farmer would detect yellow trefoil seed in bulk or sweet clover seed in bulk were it not for the characteristic odor of the latter. Bur clover seed would be found even more deceiving.

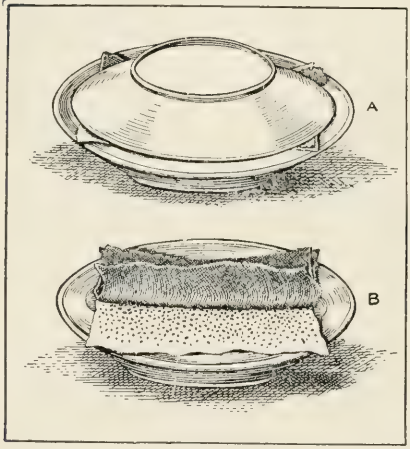


FIG. 15.—Homemade seed germinator: A, closed; B, open.

The chances for deception are even greater with grass seeds than with clover seeds, because of the striking similarity between the seeds of different kinds when seen in bulk. This similarity and the fact that mere casual examination is usually given seed by purchasers makes adulteration, substitution and misbranding possible.

The remedy lies in familiarity with the distinguishing characters of individual seeds. By comparing seeds of the several kinds with the illustrations and descriptions here given, one should be able to distinguish them individually without much difficulty.

Leguminous Seeds.—All the true clovers (as red, alsike, white and crimson), alfalfa, the vetches, trefoil, sweet clover and bur clover, produce seeds in a pod which (except in trefoil, sweet clover and bur clover) opens at maturity. In red clover, trefoil and sweet clover a single seed is produced in each pod. Consequently, the seeds of each kind are very similar in form. (See figs. 22, 23 and 27.) Alfalfa and bur clover produce several seeds in a spiral pod, resulting in considerable variation in the form and size of individual seeds. (See figs. 6 and 26.) Seeds of the true clovers, alfalfa, trefoil, bur clovers and sweet clover are more or less flattened and (excepting crimson clover) are notched in the edge. Within this notch the seed scar, or point of attachment to the plant, appears as a small but distinct ring. (See figs. 22 and 26.) In the more or less spherical seeds of the vetches the scar is an oval, wedge-shaped, or slender spot on the curved surface. (See fig. 32.) In this class of seeds the scar is an important mark of distinction. In several of the small-seeded kinds of leguminous plants occasional pods appear even in well-cleaned lots of seed. (See figs. 22, 23 and 27.)

Most of the grass seeds, also oats and barley, appear "in the chaff," that is, the grains or kernels of the seed, illustrated by the kernels of wheat and the hulled seeds of timothy, are usually covered by the dried chaffy flower scales. (See fig. 16.) The difference in size, form and structure of this chaff marks the different kinds of grass seeds.

Seeds of the Grasses.—Grass seeds are produced in clusters (spikelets). Some clusters contain several seeds arranged along a common axis (rachilla). At maturity the clusters break apart, each seed carrying a piece of the cluster axis (rachilla segment). Such seeds have two chaff scales, one (the lemma) larger than the other (the palet or palea). (See fig. 16.) Examples of this class of grass seeds are found in orchard grass, meadow fescue, rye-grass, brome-grass and in the bluegrasses. (See figs. 10 and 9.) In another class of grasses each cluster contains but a single seed which, therefore, has no rachilla segment. The seeds of broom corn (or grain) millet are a good example of this class, the seed scales, lemma and palea being hard, smooth and shining. (See fig. 31, a.) Part of the seed of foxtail millet, Japanese millet, and the foxtail weeds differs structurally from the last only in being covered by two or three additional chaffy scales, which constitute the "outer chaff." (See fig. 31, b and c.)

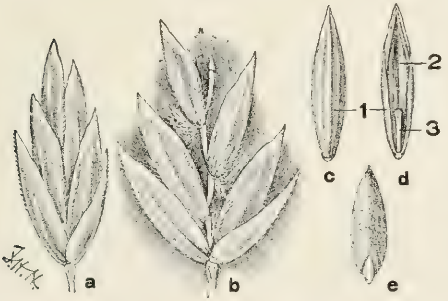


Fig. 16.—A spikelet and florets ("seeds") of Kentucky bluegrass: **a**, Spikelet as it appears at maturity; **b**, the same having the florets spread apart, showing the jointed rachilla; **c**, back view of a floret, showing the lemma (**1**); **d**, front view of the floret, showing the edges of the lemma (**1**), the palet (**2**), and the rachilla segment (**3**); **e**, the grain or kernel of the seed.

These features of form and structure are easily recognized when representative seeds come to be compared under a magnifier, and it is advisable to understand them in making tests of clover and grass seeds, because the element of certainty is essential to satisfactory results.

IMPURITIES OF FARM SEEDS.

CLASSIFICATION.

The impurities carried by farm seeds have an important bearing on the real quality of the seed. Their quantity may be sufficient to unduly increase the cost of the good seed and their character may be that of injurious weeds.

Seed impurities are classified (1) as inert material and (2) as foreign seed, including both other crop seed and weed seeds.

INERT MATERIAL.

The inert material constitutes essentially such impurities as will not grow (exclusive of dead seed), as chaff, empty seed hulls, broken seed, pieces of stems and leaves, sand, dust, etc. The chief objection to such material is that it replaces good seed, thus increasing the cost. In grass seed the inert chaff misleads by causing the seed to present a better appearance than its quality justifies, as in bluegrass seed and chaff redtop seed. As compared with weed seeds, inert material is of minor importance, a fact not to be overlooked in the purchase and use of seed. The practical seed test should point out clearly the relative importance of the inert matter and of the weed seeds found in the sample.

OTHER CROP SEEDS.

Seed of various farm crops sometimes constitutes a part of the foreign seed. Its proportion as compared with the weed seed should be noted in making the purity test. The importance to be attached to the occurrence of such crop seed depends on its nature; for illustration, the presence of timothy seed is detrimental to alsike clover seed used with a view to alsike seed production, while for hay production a mixture of timothy and alsike seed often is preferable.

WEED-SEED IMPURITIES.

Quantity and Kinds of Weed Seeds.

Very few samples of forage-crop seeds are found wholly free from weed seeds. The methods of culture and of harvesting in vogue operate against a pure seed crop. The proportion of the weed seeds appearing incidentally in the marketed seed is dependent on the number and character of the weeds in the seed-producing crop and the extent to which the seed has been cleaned before being marketed.

Weed seeds occurring in farm seed are of interest to the buyer of seed (1) in respect to their total quantity and (2) in respect to their kinds. In many instances low-grade seed contains so much weed seed that the quantity of the crop seed is thereby greatly reduced in a given weight of seed. Of the kinds of weed seeds 300 to 400 are known to occur in the various kinds of the common crop seeds. Occasionally from 75 to 100 kinds of weed seeds are to be found in a single sample of red clover or alfalfa seed not exceeding a few ounces in weight. In some instances one or more kinds of weed seed are very abundant in the sample. As a rule, however, most of the kinds are represented by only a few seeds.

The important question in regard to the kinds of weed seeds found in crop seed is whether the plants they produce are injurious or relatively unimportant. Some of the weed seeds commonly found in seed produce plants which are very detrimental to the crop or to the land. Everyone making tests of seed should become familiar with the seeds of injurious weeds. Most of the weed seeds found in making tests are seeds of comparatively harmless plants, and their recognition as to kind becomes more a matter of interest than one of practical importance.

Certain kinds of crop seeds, as clover, alfalfa, awnless brome-grass, etc., are supplied to the American market from both foreign and domestic sources. Since domestic seed is generally preferable to that which is imported, the source of the seed, as indicated by the weed seeds it contains, gives an added interest to some kinds of weed seeds. Thus the presence of seeds of perhaps several kinds of native weeds in a sample of clover seed or of alfalfa seed, together with the absence of seeds commonly found in imported seed, practically amounts to proof of its domestic production. Foreign production is strongly suggested by reverse conditions. Many kinds of weed seeds found in imported seed grow and produce plants in this country, it is true, but the growth or seed production of the plants is so meager or is so restricted to certain localities that their seeds rarely or never appear in the American-grown seed crop. When such seeds appear as several kinds together, or in abundance, they practically prove the foreign origin of the seed containing them.

The illustrations of weed seeds presented here show the seeds classified (1) as noxious weed seeds found in farm seed (figs. 17 and 18) and (2) as other weed seeds commonly found in farm seeds (figs. 19, 20 and 21). The figures, together with the brief descriptions of distinguishing characters, should enable one readily to recognize these seeds when examined with a magnifier. Weed seeds that are found with the several kinds of clover, grass and cereal seeds are mentioned under the subsequent discussion of the testing of these crop seeds.

Noxious Weed Seeds Found in Farm Seeds.

The following brief descriptions point out the most conspicuous distinctions between the seeds of various noxious weeds. They only supplement the illustrations to which they refer and which show the general form and structure and the natural size of the seeds. The serial order is employed for ready reference in the subsequent discussion of testing particular kinds of seeds.

The seeds of sand bur (fig. 17, **a**) have somewhat the appearance of small wheat kernels, usually light brown or straw-colored; common in alfalfa seed from the Great Basin region. The spiny burs of this grass reduce the feeding quality of alfalfa hay.

The seeds of wild oats (fig. 17, **b**) are similar to seeds of cultivated oats, but always have a twisted and bent, brown or straw-colored awn (sometimes broken away) from near the middle, a tuft of light-brown hairs on the rachilla segment and about the characteristic, cup-shaped rim of the scar at the base of the seed; widely distributed and common in seeds of cereals (especially oats) and large-seeded grasses.

Chess (or cheat) seeds (fig. 17, **c**) are straw-colored, sometimes greenish or brown when in the chaff (as figured), the awn at the apex often broken away, the club-shaped form of the rachilla segment distinguishing this from cultivated grass seeds; common in seeds of cereals and large-seeded grasses generally; the reddish-brown, trough-shaped free grains sometimes appear in clover seed.

Darnel seeds (fig. 17, **d**) are robust, straw-colored, and in the absence of the slender awn somewhat resemble large seeds of meadow fescue and English rye-grass; common in seed of cereals, particularly wheat.

Quack (or couch) grass seeds (fig. 17, **e**) closely resemble fescue and rye-grass seeds, but they are usually slenderer, light (or yellowish), sometimes greenish-colored; whole spikelets having the two empty scales noticeably joined at the same level at the base of the spikelet (thus differing from most grass spikelets) are invariably found with the individual seeds. Commonly found in seeds of cereals and the coarse grasses, especially in the seed of awnless brome-grass imported from Europe.

Dock seeds (fig. 17, **f**) are sharply 3-angled, reddish-brown, smooth and shining; one of the commonest of the weed seeds of farm seeds generally, the reddish-brown ripened flowers (shown at the right of the figure) commonly appearing in seeds of cereals and coarse grasses. Several kinds of dock seeds occur in farm seeds, the commonest being that of curled dock (figured). The similar seeds of broad-leaved (or bitter) dock are sometimes found. Another kind having smaller seeds which are rounded instead of pointed at the base occurs in Chilean red clover seed.

Black bindweed seeds (fig. 17, **g**) are coarse, 3-angled, black when the outer covering is removed; the outer straw-colored, greenish, or brown covering (flower scales) may be present or partly or wholly broken away; common in all kinds of coarse farm seeds from all sources, particularly in seed of cereals, millet and flax.

Russian thistle seeds (fig. 17, **h**) occur both with and without the gray or light-brown hull (flower scales); the seeds proper have a thin coat covering the slender spirally coiled, greenish embryo; common in alfalfa seed from the Western States and in flaxseed; doubtless occasionally introduced in seed from Russia. As an impurity of alfalfa seed it strongly suggests Western States production.

The seeds of corn cockle (fig. 17, **i**) are black or brown, angular, and covered with fine spiny tubercles; common in seed of cereals, millets, vetches and flax from all sources.

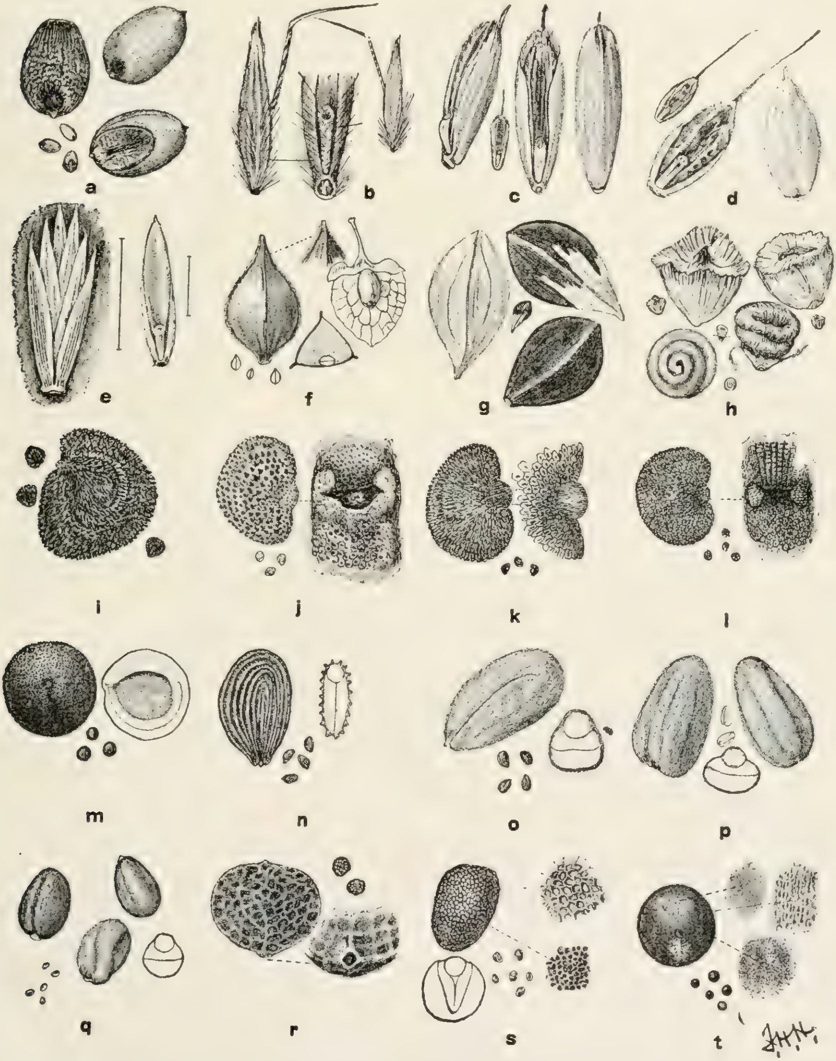


FIG. 17.—Noxious weed seeds found in farm seeds (No. 1): **a**, Sand bur; **b**, wild oat; **c**, chess; **d**, darnel; **e**, quack-grass; **f**, dock; **g**, black bindweed; **h**, Russian thistle; **i**, corn cockle; **j**, white campion; **k**, bladder campion; **l**, night-flowering catchfly; **m**, cow cockle; **n**, pennycress; **o**, field peppergrass; **p**, large-fruited false flax; **q**, small-fruited false flax; **r**, ball mustard; **s**, black mustard; **t**, English charlock. (Enlarged and natural size.)

White campion seeds (fig. 17, **j**) are mostly light gray, the surface finely tubercled; the light color distinguishing this kind from the next two;

common in imported crimson clover and grass seeds; sometimes found in red clover seed.

Bladder campion seeds (fig. 17, **k**) are brown or nearly black, flattened, finely tubercled, the tubercles arranged in more or less distinct rows on the sides and in more distinct rows on the edges; occurs frequently in imported grass seed, and is sometimes abundant in seed of red and alsike clovers grown in the Northern States and in Canada.

Night-flowering catchfly seeds (fig. 17, **l**) are similar to the preceding, dark gray or brown, finely tubercled, the tubercles not in distinct rows on the side; very common and often abundant in seed of red and alsike clovers grown in the Northern States and in Canada. Careful comparison of seeds with the illustrations (fig. 17, **j**, **k** and **l**; fig. 19, **t**) will enable one to distinguish the similar seeds of this group of weeds. Figure 19, **t**, shows the seed of the forked catchfly, which is common in low-grade European red clover and alfalfa seed.

The seeds of cow-cockle (fig. 17, **m**) are almost perfectly spherical, black, the surface covered with fine tubercular points; very common in seeds of cereals from the West and Northwest; also, in millet and flax seeds, sometimes in imported coarse seeds; broken seeds often occur in alfalfa seed from the Western States, thus indicating its source.

Pennycress (or Frenchweed) seeds (fig. 17, **n**) are oval, flattened, brown, and have concentric ridges on the sides; often found in both domestic and imported seed of cereals, clovers, millets and flax. This is a dreaded weed in the Northwestern States.

Field peppergrass seeds (fig. 17, **o**) are reddish-brown, oval, smooth, and show a curved line on each side; common in domestic and imported seed of various clovers, grasses and cereals.

False flax seeds (fig. 17, **p** and **q**) as found in farm seeds represent two kinds of false flax (plants in no way related to the true flax). Seeds of the large-fruited false flax (fig. 17, **p**) are light yellow and much larger than those of the other kind; very common in flax seed (hence the common name); also, in millet and sometimes in alfalfa seed; common in coarse farm seeds from Russia. Seeds of small-fruited false flax (fig. 17, **q**) are much smaller than the others, and darker, being reddish-yellow; common in Canadian red and alsike clovers and timothy seed.

Ball mustard seeds (fig. 17, **r**) are unopened, straw-colored, brown or purplish pods, having a network of ridges over the surface and containing a single yellowish seed within; found in seed of cereals, millets and flax; sometimes in imported seed. This is a troublesome weed in certain sections of the Northern States.

Black mustard seeds (fig. 17, **s**) are small, commonly somewhat oblong, and reddish-brown or dark brown, sometimes gray, surface pitted, due to a network of ridges; taste distinctly pungent; sometimes found in clover and grass seeds.

English charlock, or wild mustard, seeds (fig. 17, **t**) are almost spherical, slightly variable in size, black, reddish-brown, or sometimes light brown, the surface comparatively smooth, which distinguishes this seed from seed of other mustards and rape; taste somewhat pungent; a frequent impurity of nearly all the common clover, grass and cereal seeds; sometimes an adulterant of rape seed.

Indian (or brown) mustard seeds (fig. 18, **a**) are oblong-spherical, averaging larger than those of charlock, light-reddish brown, the surface having a distinct network of fine ridges; taste not pungent; occurring chiefly in seed of cereals, millets and flax; common in imported flax seed; sometimes mixed with rape seed.

Hare's-ear mustard seeds (fig. 18, **b**) are oblong, surface granular, dark brown, and if placed in water develop mucilage which forms whitish projecting points over the surface on drying; common in seed of cereals, millets and

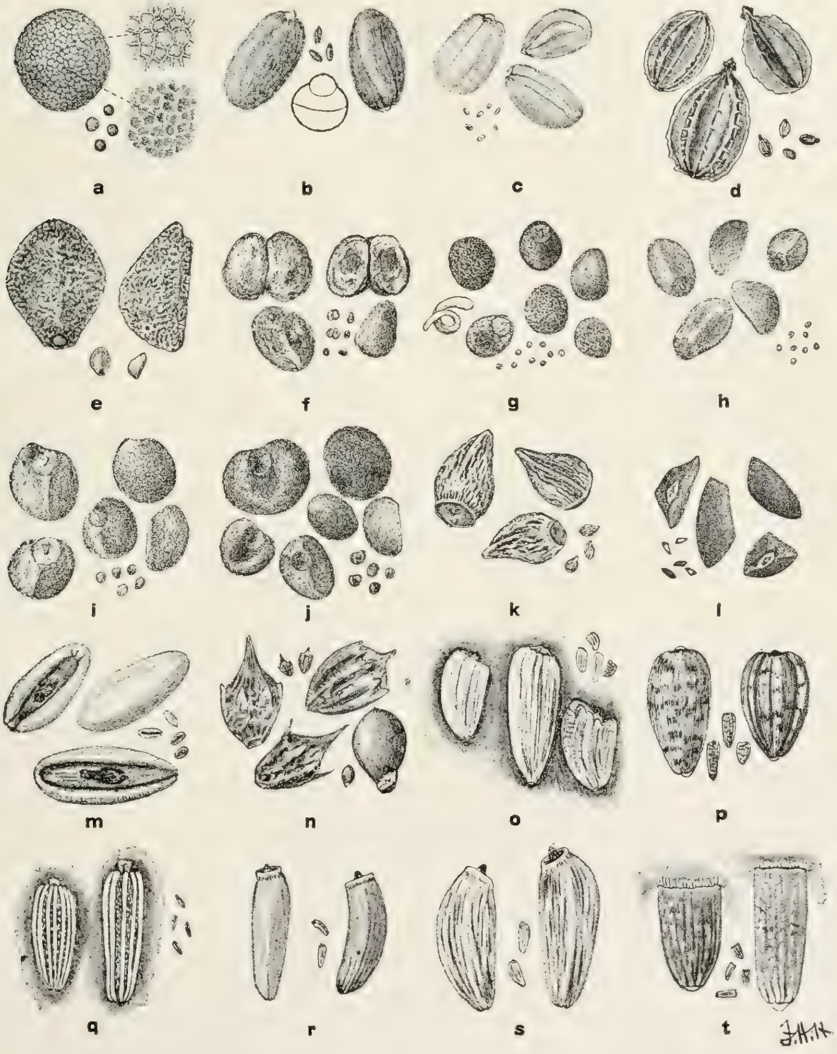


FIG. 18.—Noxious weed seeds found in farm seeds (No. 2): **a**, Indian mustard; **b**, hare's-ear mustard; **c**, tumbling mustard; **d**, wild carrot; **e**, field bindweed; **f**, flax dodder; **g**, clover dodder; **h**, small-seeded alfalfa dodder; **i**, field dodder; **j**, large-seeded alfalfa dodder; **k**, corn gromwell; **l**, rat-tail plantain; **m**, buckhorn; **n**, ragweed; **o**, gumweed; **p**, wild sunflower; **q**, oxeye daisy; **r**, Canada thistle; **s**, bull thistle; **t**, wild chicory. (Enlarged and natural size.)

flax; often in imported seed. This is an objectionable weed of the Northern States.

Tumbling mustard seeds (fig. 18, **c**) are very small, flattened, oblong and yellowish, often with a greenish line along the side; found in clover and flax seed from the Northwest.

Wild carrot seeds (fig. 18, **d**) are light brown, oval, flattened, nearly plane on one side and ridged lengthwise on the other, the ridges often bearing the remnants of whitish spines; common in red clover and in imported alfalfa seeds, sometimes found in grass seed.

Field bindweed seeds (fig. 18, **e**) are coarse, oval, rounded on one side and angular on the other, gray, owing to numerous light-colored raised spots on the surface; common in seeds of cereals, in flax, and in other coarse seeds.

Seeds of the dodders (fig. 18, **f-j**) as as group are recognized by their dull, finely roughened surface, together with their rounded or angular form and their small size. The slender spirally coiled embryo of the seed, devoid of two cotyledons, is characteristic of dodder seed[a].

Flax dodder seeds (fig. 18, **f**) are rounded on one side and angular on the other, many of the seeds united together in pairs; soiled gray in color; found only in flax seed; common in imported seed and in some domestic seed. (See fig. 12.)

Clover dodder seeds (fig. 18, **g**) are very small, nearly spherical as a rule, gray or brown; often distinctly pitted; common in imported clover and alfalfa seeds; not found in grass seed. (See figs. 1 and 2.)

Small-seeded alfalfa dodder seeds (fig. 18, **h**) are similar in size to seeds of clover dodder, but are more oval and angular in form; colors yellowish, greenish or purplish; common in alfalfa seeds from the Western States. Of the dodders infesting alfalfa this is the most widely distributed within the United States. Its seed is not found in red clover or grass seeds.

The seed of clover dodder and small-seeded alfalfa dodder are sufficiently small to admit of being wholly removed from clover or alfalfa seed of good grade by the use of a sieve of proper mesh (about 20 to the inch). Clover dodder is a menace in any part of the country. Small-seeded alfalfa dodder appears to be naturally confined to the dry regions of the West.

Field dodder seeds (fig. 18, **i**) are larger than those of clover or small-seeded alfalfa dodder, rounded on one face and flattened and angular on the other; the characteristic seed scar is a more or less distinct, circular area, having a short, raised whitish line in its center; seeds from the Great Basin region gray or pinkish, those from Chile (evident in Chilean red clover and alfalfa seed) reddish-brown; found in both red clover and alfalfa seed, commonest in western-grown alfalfa seed and in Chilean red clover and alfalfa. The plants are very destructive to clover and alfalfa.

Large-seeded alfalfa dodder seeds (fig. 18, **j**), the largest of the dodders found in alfalfa, are variable in size; some are not larger than and are similar to the seeds of field dodder; the largest are nearly circular, rounded and flattened; color gray, greenish, or more commonly brown; scar devoid of the raised whitish line to be seen in field dodder and often indistinct; found only in alfalfa seed produced in the Western States. This dodder does not appear to thrive in the Eastern States. Field dodder and large-seeded alfalfa dodder are termed large-seeded because their seeds can not be wholly removed from clover and alfalfa seed. The greater part of the field dodder can be removed by the use of a sieve of 20 meshes to the inch.

Corn gromwell seeds (fig. 18, **k**) are oval, gray or brown, and being very hard, the name "stoneseed" is often applied to them; found in seed of red and crimson clovers, alfalfa, cereals, grasses, etc.

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[a] See Farmers' Bulletin 306, "Dodder in Relation to Farm Seeds."

Rat-tail plantain seeds (fig. 18, **l**) are small, flat, angular and black; the scar in the center of one side; common in seed of clovers and some grasses. Known also as broad-leaved plantain and as Rugel's plantain; a persistent weed.

Buckhorn seeds (fig. 18, **m**) are smooth, shining, rounded on one side with a deep groove on the other, brown or amber colored, becoming coated with mucilage when placed in water[a]; one of the commonest impurities of farm seeds, often very abundant in seed imported from Europe. Not abundant in alfalfa seed produced in the Western States. Known also as plantain, English or narrow-leaved plantain, and rib-grass.

Ragweed seeds (fig. 18, **n**), as they commonly occur, are somewhat top shaped, usually with a crown of several teeth or spines; the outer covering is often broken away, the seed then appearing pear-shaped, smooth and brown; common in American red clover and in cereal grain.

Gumweed seeds (fig. 18, **o**) are whitish or straw-colored, variable in form, sometimes wrinkled; found chiefly in alfalfa seed from the Western States.

Wild sunflower seeds (fig. 18, **p**) have the form and the striped, mottled appearance familiar in the cultivated sunflower seeds, but are much smaller; common in alfalfa seed and other seeds from the Western States.

Oxeye daisy seeds (fig. 18, **q**) are very small, but are readily distinguished by the 10 slender, white ridges which extend from end to end, one end usually bearing a knob-like projection; found frequently, but usually not abundant, in clover seed and small grass seed.

Canada thistle seeds (fig. 18, **r**) are smooth, light brown, straight or curved, having a cup-like rim at one end, a projecting point often within the rim; found in clover seed, particularly alsike from Canada; sometimes in seed of clover and grasses from Europe.

Bull thistle seeds (fig. 18, **s**) are larger than those of the Canada thistle, light colored, striped lengthwise with brown, the rim at one end often yellowish; common in red clover, alfalfa and grass seeds.

Wild chicory seeds (fig. 18, **t**) are brown or straw-colored, usually mottled, the crown scales at the broader end sometimes rubbed away; common in imported clover, alfalfa, and certain kinds of grass seeds, occurring in lesser degree in American-grown seed.

Other Weed Seeds Commonly Found in Farm Seeds.

Certain kinds of weed seeds other than those termed noxious under the preceding heading are found frequently, sometimes abundant, in various kinds of farm seeds, and thus cause inquiry from one examining seeds. The degree of noxiousness of this class of weed seeds differs with the kinds and with the conditions of locality, climate, etc., under which they are sown. While some of the kinds included in the present list are looked upon, at least locally, as pests, many of the kinds mentioned are of little importance as field weeds. Since it is essential to distinguish the relatively unimportant from the important seeds, a fairly accurate classification of the weed seeds found in farm seeds with respect to their relative importance is a desirable feature of popular seed testing.

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[a] See "An Improved Method of Separating Buckhorn from Red Clover and Alfalfa Seeds," Circular 2, Bureau of Plant Industry, U. S. Dept. of Agriculture, 1908.

The following brief descriptions refer serially to illustrations of 60 kinds of weed seeds shown in figures 19, 20 and 21:

Crab-grass seeds (fig. 19, **a**) usually bear the outer chaff, which is often soft-hairy, one scale as long as the seed and distinctly 3-ridged, the other half the length of the seed; straw-colored, brown or purplish; common in seeds of clovers, alfalfa and grasses; plants sometimes very troublesome.

Witch-grass seeds (fig. 19, **b**) occur both with and without the outer chaff, which is lance-shaped, smooth and brown; seeds free from the chaff are oval, light gray or dark gray, smooth and polished; common in seeds of clovers, alfalfa and grasses; plants widely distributed; comparatively unimportant.

Yellow foxtail seeds (fig. 19, **c**) are oval, flat on one side and arched on the other, chaff straw-colored, light brown or greenish, as long as the seed on the flat face, a half-length scale on the arched face; the light-colored or dark-colored seed within the chaff distinctly ridged crosswise on the arched face, often free from the outer chaff; common in many kinds of farm seeds.

Green foxtail seeds (fig. 19, **d**) are oval, convex on both faces, the whitish or straw-colored outer chaff as long as the seed on both faces; seed within the chaff straw-colored, gray or brown, the darker seeds often mottled, the surface finely roughened and dull; common in many kinds of farm seeds. Both yellow and green foxtail grasses are widely distributed summer weeds, occupying valuable space in crops. Green foxtail seeds are distinguished from seeds of foxtail millet by their smaller size and rough, dull surface.

Velvet grass seeds (fig. 19, **e**) usually appear in the chaff, which is thin, oval and straw-colored, the surface covered with fine, stiffish hairs; a single oval, shining seed usually found within the chaff; a common impurity of coarse grass seeds.

Soft chess seeds (fig. 19, **f**) are lance-shaped, usually much flattened, straw-colored, the lemma awned at its apex, its back usually wrinkled, the palea and grain shorter than the lemma; common in imported coarse grass seeds; widely distributed in the United States, but not an important weed except on the Pacific coast.

Sedge seeds (fig. 19, **g**), when covered by the chaffy hull, are flask shaped, straw-colored, brown, or greenish, flattened and thin with respect to the several kinds found in farm seeds; seeds freed from the outer chaff are oval, lens-shaped, and light brown; common in grass seeds, particularly bluegrass seed; plants comparatively unimportant.

Sorrel (or sheep's sorrel) seeds (fig. 19, **h**) are small, oval, 3-angled, the outer chaffy hull dull reddish-brown; seeds freed from the hull are reddish-brown, smooth and polished; found in farm seed both with and without the hull; a common impurity, appearing in seeds of clovers, grasses, poorly cleaned cereals, millets, etc.; a cosmopolitan weed often troublesome until subdued.

Knotweed seeds (fig. 19, **i**) are sharply oval, 3-angled, dull reddish-brown in the absence of the brown chaffy covering, a part of which is usually borne at the broader end; common in clover seed and grass seed; plants usually of minor importance as field weeds.

Pale knotweed seeds (fig. 19, **j**) are nearly circular, flattened, and chestnut brown when freed from the reddish-brown, sometimes adherent, chaffy covering; common in seed of coarse grasses, cereals and flax, often abundant in imported seed. The plants grow chiefly in moist places and are not troublesome on uplands.

Lady's-thumb seeds (fig. 19, **k**) are usually free from the chaffy covering and are then black, shining, broadly oval, and flattened, or sometimes 3-angled; common in various kinds of farm seeds, particularly American-grown red clover seed. The habit of the plant is similar to that of the preceding knotweeds, to which it is closely related. This plant is common on dry uplands.

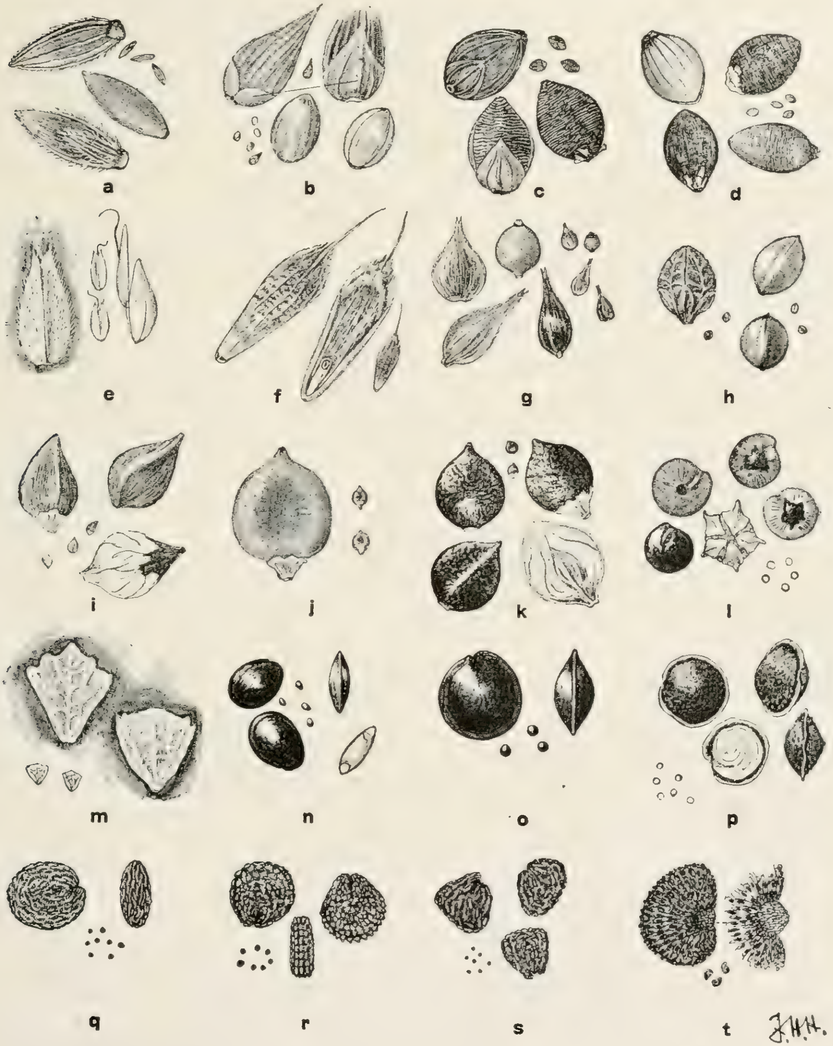

FIG. 19.—Other weed seeds commonly found in farm seeds (No. 1): **a**, Crab-grass; **b**, witch-grass; **c**, yellow foxtail; **d**, green foxtail; **e**, velvet grass; **f**, soft chess; **g**, sedge; **h**, sorrel; **i**, knotweed; **j**, pale knotweed; **k**, lady's-thumb; **l**, lamb's-quarters; **m**, wild saltbush; **n**, rough amaranth; **o**, spreading amaranth; **p**, wild spurry; **q** and **r**, chickweed; **s**, mouse-ear chickweed; **t**, forked catchfly. (Enlarged and natural size.)

Lamb's-quarters (goosefoot) seeds (fig. 19, **l**) are small, lens shaped, dark brown, or black and shining, sometimes found within a chaffy covering of five scales; common in all kinds of farm seeds, particularly clover and grass seeds; a well-known weed of gardens, cultivated fields and meadows.

Wild saltbush seeds (fig. 19, **m**) are thin, triangular or wedge-shaped, veined, straw-colored or purplish, their two scales inclosing a single small seed; found in American-grown alfalfa, not appearing in imported seed.

Amaranth (pigweed) seeds (fig. 19, **n** and **o**) are lens-shaped, black, and highly polished. Seeds of rough amaranth (fig. 19, **n**) are oval in outline; those of tumbling amaranth are somewhat smaller and nearly circular in outline, while seeds of spreading amaranth (fig. 19, **o**) are much larger and nearly circular in outline, the sides being strongly convex. Seeds of rough amaranth and of tumbling amaranth are common in various kinds of farm seeds, particularly clover. Spreading amaranth is native in the Western States and its seeds often appear in alfalfa from that region.

Wild spurry seeds (fig. 19, **p**) are very small, black and nearly spherical. A narrow light-colored rim encircles the seed and serves to distinguish it from other weed seeds. Some seeds are flecked with whitish particles; common in imported clover seed.

Chickweed seeds (fig. 19, **q** and **r**) are small, mostly brown, nearly circular, and flattened; one kind (fig. 19, **q**), common in clover seed imported from Europe, has numerous interlacing wrinkles covering the surface, the other kind (fig. 19, **r**) is borne by a common weed in lawns, gardens, and thin meadows, has the surface covered with individual tubercles arranged in more or less distinct rows, and is found in both imported and domestic clover seed.

Mouse-ear chickweed seeds (fig. 19, **s**) are minute, flattened, wedge shaped, tubercled, and distinctly reddish-brown; common in small clover and grass seeds, particularly in alsike and timothy produced in Canada. This is a somewhat insignificant weed of lawns and thin meadows.

Forked catchfly seeds (fig. 19, **t**) are very similar to those of white campion (fig. 17, **j**), bladder campion (fig. 17, **k**), and night-flowering catchfly (fig. 17, **l**), but differ in having the tubercles on each face of the seed arranged in a few distinct rows. These kidney-shaped brown seeds often appear in European-grown red clover and alfalfa seed.

Creeping buttercup seeds (fig. 20, **a**) are oval, flattened, brown or reddish brown, with a lighter rim, and have a prominent, straight or slightly curved beak; common in imported crimson clover, meadow fescue and rye-grass seeds.

Peppergrass seeds (fig. 20, **b**) are oval, flattened, thin, reddish-yellow, and have a curved groove on each face; common, and sometimes abundant, in clover and grass seeds, particularly in timothy; a widely distributed annual weed of waysides, gardens and meadows.

Shepherd's-purse seeds (fig. 20, **c**) are minute, reddish yellow, oblong and flattened with two more or less distinct grooves on each face; common in seeds of white, alsike, and poorly cleaned red clovers; a cosmopolitan, annual weed.

Cinquefoil seeds (fig. 20, **d**) are minute, straw-colored, oval, and lens-shaped, the faces bearing curved and forked ridges; common in alsike clover and timothy.

Hop clover seeds (fig. 20, **e**) are minute, elliptical, yellowish, the surface smooth and shining; common in poorly cleaned clover seed. The reddish flowers (shown at the right of the figure) are common in imported orchard grass, meadow fescue, and rye-grass seeds.

Yellow trefoil seeds (fig. 20, **f**) are oval with a projecting point on the edge, yellowish brown, or tinged with green. Besides being used as an adulterant of clover and alfalfa seed, some seeds occur incidentally in clover and grass seeds. Mature, black, oval pods or immature green pods are common in coarse grass seeds. The plants are widely distributed here and in foreign countries.

Bird's-foot trefoil seeds (fig. 20, **g**) are small, nearly spherical, brown, and often mottled; frequently found in imported clover and alfalfa seeds; a cultivated plant in Europe.

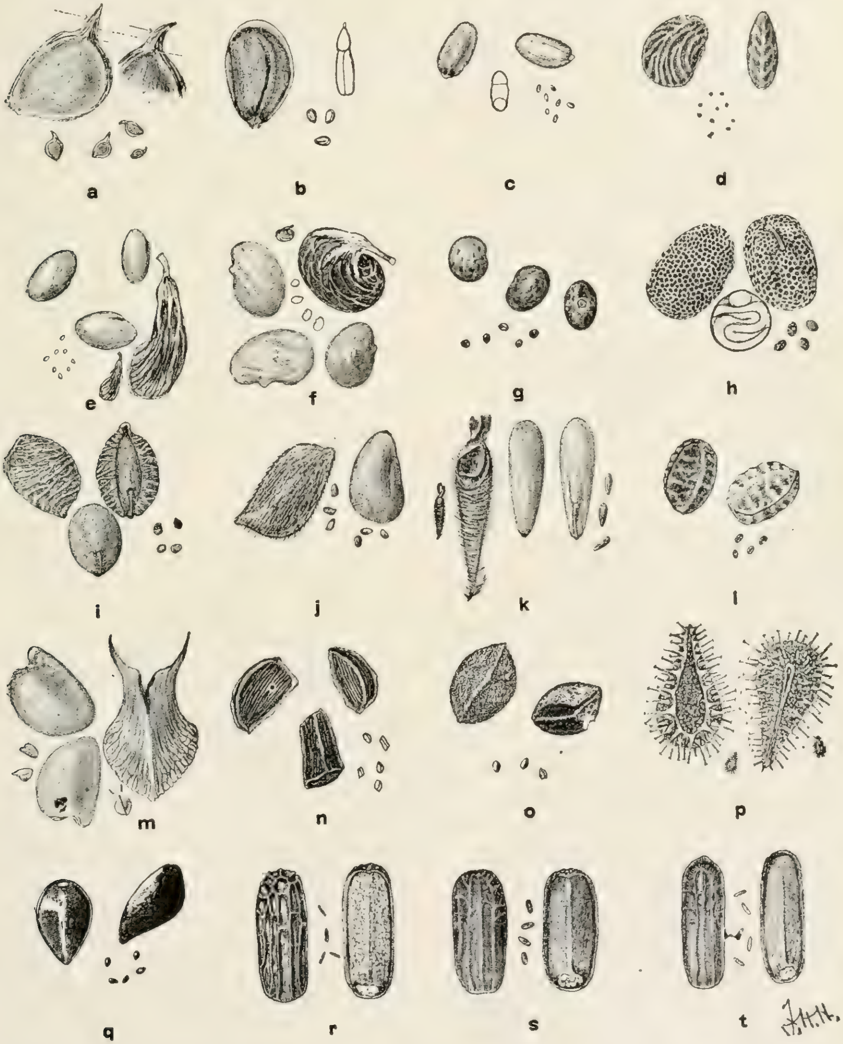

FIG. 20.—Other weed seeds commonly found in farm seeds (No. 2): **a**, Creeping buttercup; **b**, peppergrass; **c**, shepherd's-purse; **d**, cinquefoil; **e**, hop clover; **f**, yellow trefoil; **g**, bird's-foot trefoil; **h**, **i** and **j**, wild geraniums; **k**, stork's-bill; **l**, spurge; **m**, spiny sida; **n**, evening primrose; **o**, red pimpernel; **p**, sticktight; **q**, forget-me-not; **r**, **s** and **t**, vervain. (Enlarged and natural size.)

Wild geranium seeds (fig. 20, **h**, **i** and **j**) as commonly found in farm seeds represent three kinds of plants. Seeds of one kind (fig. 20, **h**) are oblong and pitted, having a whitish or light-brown network over a darker brown background (thus readily distinguished from other seeds); common in imported crimson clover and coarse grass seeds. Another kind (fig. 20, **i**) has smaller, smooth, rounded seeds which are often covered by a brown hull bearing several diagonal ridges on each side; often found in imported clover and grass seeds. A third kind (fig. 20, **j**) has more oval, smooth seeds, some of which are covered by a somewhat flattened, finely hairy hull; found in imported clover and grass seeds.

Stork's-bill seeds (fig. 20, **k**) are somewhat club shaped, smooth, brown, and often covered by a sharp-pointed, brown, hairy hull; found in clover, alfalfa and grass seeds; commonest in imported seed.

Spurge seeds (fig. 20, **l**) are steel gray or dark brown, oval, and somewhat 4-angled, the angles lightest colored, a few cross-ridges between the angles, one of the angles bearing a slender, black line; common in American red clover seed.

Spiny sida seeds (fig. 20, **m**) are brown, rounded on one side, angular on the other, and notched at the broader end; common in American-grown red clover seed; the forked, often netted-veined seed vessels (shown at right-hand side of figure) sometimes appear in poorly cleaned clover, but are more common in grass seeds.

Evening primrose seeds (fig. 20, **n**) are small, reddish brown, and angular, prismatic, or curved; the corners are thin-edged, the faces finely grooved; common in timothy and sometimes found in clover seed.

Red pimpernel seeds (fig. 20, **o**) are small, 3-angled, and reddish brown; surface finely roughened or sometimes partly smooth and black; somewhat resemble seeds of sorrel (fig. 19, **h**) having the chaffy covering; very common in imported clover and alfalfa seeds, often in grass seed.

Sticktight seeds (fig. 20, **p**) are small, oval, brown burs having many barbed prickles; when in clover, most of the prickles are usually broken away; when in grass seeds, some or all of the prickles are usually uninjured; found in red clover, particularly that from Canada, in seed of coarse grasses, millets, cereals, and flax; often in seed imported from Europe.

Forget-me-not seeds (fig. 20, **q**) are small, black, shining, oval, rounded on one face, and angled on the other; common in imported clover and grass seeds.

Vervain seeds (fig. 20, **r**, **s** and **t**) are oblong, reddish or dark brown, veined on one side, angled and often gray on the other. One kind (fig. 20, **r**) has a distinct network of ridged veins on the back, the surface between the veins shining; common in European clover and alfalfa seeds. The other two kinds of vervain commonly found in farm seeds have indistinct veins on the back which is dull, one of them (fig. 20, **s**) being comparatively broad and brown; the other (fig. 20, **t**) being slender and lighter, reddish colored; seeds common in American-grown clover seed.

Catmint seeds (fig. 21, **a**) are oval, dark reddish brown or darker, smooth and dull, readily distinguished by the two white scar spots, side by side at one end of the seed; common in clover seed, particularly Canadian-grown alsike.

Healall seeds (fig. 21, **b**) are light brown, oval, with a characteristic whitish appendage at the pointed end, faint dark lines traversing the faces and edges; one of the commonest impurities of both domestic and imported clover and grass seeds.

Rough-leaved toadflax seeds (fig. 21, **c**) are very small, oblong, having a light-brown, wrinkled surface; plants not evidently important, but the seeds, as common impurities of imported clover seed, indicate the foreign origin of the lots containing them.

The smaller broad-leaved plantain seeds (fig. 21, **d**) are similar to those of rat-tail plantain (fig. 18, **l**), but are smaller, greenish or brown, the surface having slender, wavy dark lines; common in poorly cleaned clover and grass seed.

Bracted plantain seeds (fig. 21, **e**) are similar to those of buckhorn (fig. 18, **m**), but they are broader, dull reddish-brown, and the broad groove on one face is bordered by a white stripe; the rounded face is crossed near its center by a shallow groove; common in American-grown red clover seed; sometimes found in alfalfa and grass seeds and occasionally in imported seed; a common annual plant of light lands.

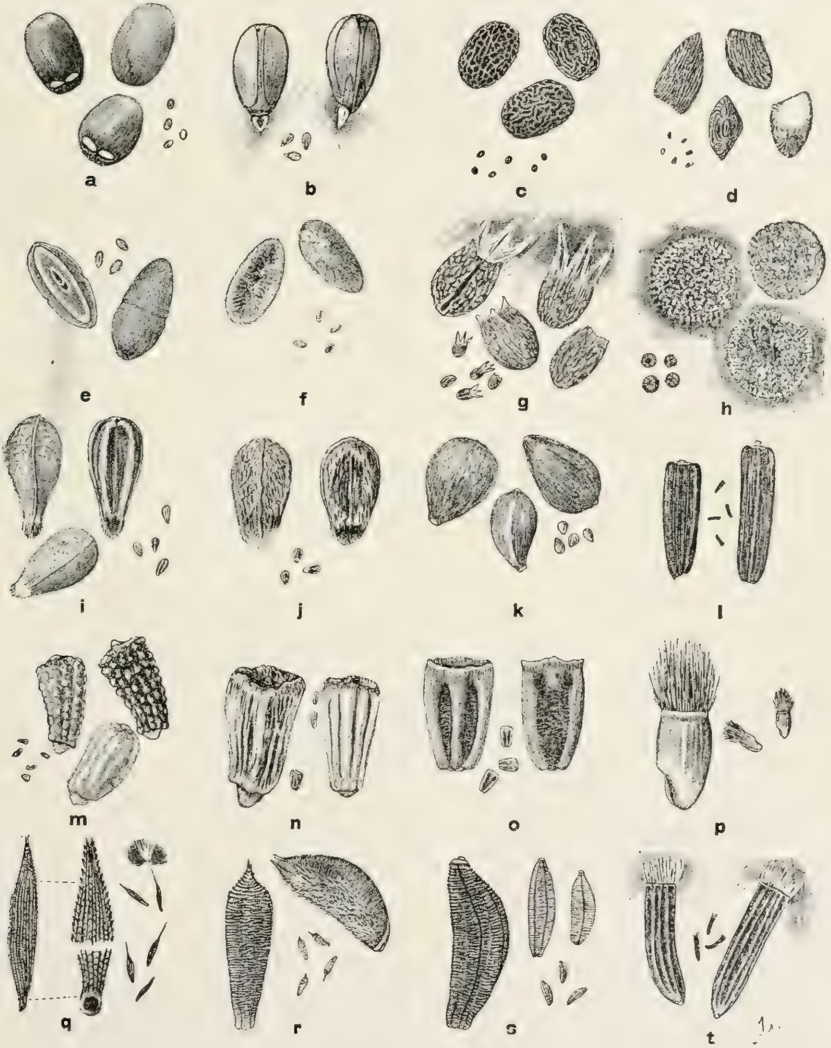

FIG. 21.—Other weed seeds commonly found in farm seeds (No. 3): **a**, Catmint; **b**, healall; **c**, rough-leaved toadflax; **d**, smaller broad-leaved plantain; **e**, bracted plantain; **f**, dwarf plantain; **g**, field madder; **h**, cleavers; **i** and **j**, wild corn salad; **k**, poverty weed; **l**, black-eyed Susan; **m**, dog fennel; **n**, field camomile; **o**, scentless camomile; **p**, corn flower; **q**, cat's-ear; **r**, oxtongue; **s**, hawkweed picris; **t**, hawkweed. (Enlarged and natural size.)

Dwarf plantain seeds (fig. 21, **f**) are light-brown, oval, rounded on one face, and broadly grooved on the other; found in crimson clover seed produced in Atlantic Coast States.

Field madder seeds (fig. 21, **g**) are oval, gray in having numerous white surface spots, some of the seeds having three frail, whitish teeth, others devoid of the teeth; common in seed of clover, alfalfa and grasses; confined chiefly to imported seed.

Cleavers seeds (fig. 21, **h**) are coarse, circular, one face rounded, the other depressed in the center; the surface is covered with hair-bearing tubercles from which the hairs may be more or less rubbed away; the entire outer surface is sometimes rubbed away, leaving the seed smooth and brown; common in seed of coarse grasses, millets, cereals and flax; a common impurity of imported seed.

Seeds of wild corn salad representing two kinds, commonly appear in clover imported from Europe. They are brown, one kind (fig. 21, **i**) being slenderly oval and nearly smooth, the other (fig. 21, **j**) being broader and usually more or less covered with white hairs. The presence of these seeds in clover indicates its foreign production.

Poverty weed seeds (fig. 21, **k**) are oval and dull brown, straight, or somewhat curved. They occur in alfalfa seed from the Western States; not found in foreign-grown seed.

Black-eyed Susan, or yellow daisy, seeds (fig. 21, **l**) are minute, black, prismatic, finely ridged lengthwise, and 4-angled; found chiefly in timothy seed.

Mayweed (dog fennel) seeds (fig. 21, **m**) are oval or club shaped, straw-colored or brown, ridged lengthwise, the ridges more or less distinctly tubercled; very common in both domestic and imported seed of clover and grasses.

Field camomile seeds (fig. 21, **n**) are prismatic, some broad and deeply grooved lengthwise, others slender and lightly grooved or smooth; color whitish, light brown or dark brown; common in domestic and imported clover and grass seeds.

Scentless camomile seeds (fig. 21, **o**) are prismatic, the surface rough and black, one face having three prominent brown ribs, the other showing two of these ribs and a partial third rib; common in poorly-cleaned clover seed and grass seed, particularly the seed of sweet vernal grass imported from Europe.

Corn flower (blue bottle) seeds (fig. 21, **p**) are easily recognized by the bluish color of the body of the seed and the tawny color of the brush of bristles each bears; common in both domestic and imported coarse seeds, including crimson clover, grasses, cereals, millets and flax.

Cat's-ear seeds (fig 21, **q**) are slender, reddish brown, rough, and sometimes bear a slender beak tipped by a brush of whitish bristles; found in clover seed and grass seed, a common impurity of imported seed.

Oxtongue seeds (fig. 21, **r**) are mostly lance-shaped, reddish yellow, the surface having dark transverse lines, the margin at the broader end of the seed roughened (as shown at the left of the figure); a part of the seeds whitish, curved, the inner curved edge white-hairy (shown at the upper right-hand of the figure); common in poorly cleaned red clover and alfalfa seed imported from Europe; not found in domestic-grown seed.

Hawkweed picris seed (fig. 21, **s**) are reddish-brown, straight or curved, bearing fine transverse, dark-edged ridges, the faces of the seed having one or two slender grooves lengthwise; frequently found in imported red clover and alfalfa seed.

Hawkweed seeds (fig. 21, **t**) are small, black, cylindrical, ridged lengthwise, pointed at one end, the opposite end bearing a short brush of fine, white bristles; common in grass seed. The seeds of several kinds of hawkweed are similar. One kind is the orange hawkweed, which has proved troublesome in the Northeastern States.

DETAILS OF MAKING SEED TESTS.

Procedure.—Certain details of procedure in making seed tests should be followed if tests of seeds of different kinds are to be fairly comparable. The natural course to be followed in testing forage-crop seeds involves, in general, the preparation of the small sample for actual test, its examination, the separation of the crop seed and its impurities, a test of the germinating power of the crop seed, and the determination of the actual value of the seed as compared with pure seed.

Careful work in making a test is comparatively useless if the sample does not fairly represent the bulk of the seed from which it is taken.

The responsibility for selecting the small trade sample rests entirely with the dealer who submits it. When seed in bulk, as in a sack, is to be sampled, small amounts of seed should be taken from the top, bottom, sides and center of the sack. If the sack be emptied and the seed thoroughly mixed, it is probable that a fairer sample can be taken.

The Test Sample.—Since the small sample thus taken or the trade sample will be too large to be tested in its entirety, it must be again subdivided to obtain the test sample. In official tests this all-important subdivision is effected by the use of a mechanical mixer, which takes a little from all parts of the larger quantity. In home testing perhaps there is no better plan than to pour the seed in a symmetrical pile on a flat surface and carefully subdivide it by means of a table knife. A subdivision amounting to a teaspoonful for the clovers and small-seeded grasses, a tablespoonful for the coarse grass seeds, and a considerably larger amount for cereal grains may be accepted for the test.

The balance previously described (p. 346) having been put in proper condition for use, the total weight of the selected sample is to be taken and recorded in terms of whole and fractional shots. This permits the computation of percentages by ordinary division according to the methods used in percentage. If, however, quantities of seed balancing 6¼ or 12½ shots are used, the one-sixteenth shot weight represents 1 per cent or one-half of 1 per cent, as heretofore explained.

The Pure Seed.—After the sample is weighed it is spread on a sheet of white paper folded in the form of a tray (p. 350) and should first be examined with reference to whether it is true to name. Attention should then be directed to the possible presence of some particular adulterant liable to be present. All the foreign seeds (except certain adulterants), including other crop seeds and weed seeds, also inert matter, as pieces of stems, chaff, sand and badly broken seeds, are to be separated from the kind under test. Both plump and shriveled crop seed should be classed as "pure seed." While the shriveled seed very evidently may be worthless, it nevertheless is a part of the crop seed, and its worthlessness will appear in the subsequent germination test.

If certain specific adulterants, as trefoil, sweet clover, bur clover, Canada bluegrass and rye-grass, are found, the adulterant seeds are left mixed with the crop seed when the other foreign seeds are separated. The proportion of the adulterant is then determined by count from a part of the mixture.

If certain kinds of foreign crop seeds or of weed seeds are especially abundant it may be desirable to keep them separate from the rest in order to determine their quantity, but if not, the foreign matter for convenience may be mixed together irrespective of its character. In official tests the foreign seed and the inert matter are separated, their quantities being determined individually. After the pure seed and the foreign materials of the sample have been separated the proportion of pure seed is determined by comparing its weight with that of the entire sample, expressing the result in per cent. If quantities of seed weighing 6¼ shots or 12½ shots have been taken for the original test sample, each 1/16-shot weight of pure seed represents 1 per cent or one-half of 1 per cent, respectively.

Determination of Adulterants.[a]—When an adulterant is found and its kind ascertained by examination, its quantity must be determined. When such seed as that of trefoil, sweet clover, Canada bluegrass, and other kinds have been used, their separation from all the pure seed of a test sample is laborious and not justified by the information gained. Since the weight of these seeds is approximately the same as that of the seeds with which they are mixed, their relative proportion to pure seed is determined by count. After all other foreign seeds and other materials have been separated from the pure seed and adulterant together 1,000 seeds of the mixed crop seed and adulterant are counted out indiscriminately. This number of seeds is then carefully separated into pure-crop seed and adulterant and the number of each ascertained by actual count. If a sample of red clover seed is found to be adulterated with trefoil to the extent of 400 seeds in 1,000 seeds of the mixture, the trefoil is determined to be 400 ÷ 1,000=40 per cent of the mixture. If other foreign matter in the sample amounts to 15 per cent, the clover and trefoil mixture represents 85 per cent of the original sample. The trefoil adulterant therefore amounts to 40 per cent of 85 per cent, or 34 per cent of the seed under test.

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[a] See Farmers' Bulletin 382, entitled "The Adulteration of Forage-Plant Seeds."

Examination of Weed Seeds.—The weed seeds should be examined for kinds representing important weeds. A knowledge of what important weed seeds are liable to occur in particular kinds of crop seed is very helpful. For this reason the results of many tests are utilized in the subsequent remarks on testing particular kinds of seed. Suspected weed seeds should be carefully compared with the illustrations relating to this class of seeds. Many kinds of weed seeds not illustrated in this bulletin will be found. Most of these, as a rule, are of relatively minor importance.

The Germination Test.—It is important in separating pure seed for the germination test that the counting be done indiscriminately—without selection as to the appearance of the seed. The tendency of the beginner is to select the more promising-looking seeds for the germination test. It must not be forgotten that the purpose of the test is to learn what percentage of the total pure seed will germinate. If the more promising seed is selected, the results of the test are deceiving in favor of the dealer.

Of small seeds (such as forage crop and cereals), 200 are counted; of larger seeds 100 are taken, each in duplicate. In the special individual ear tests of corn only a few seeds are used. In adulterated samples the necessary number of pure seeds can usually be obtained from the separation of the 1,000 seeds. It is obvious that accurate counting is important to insure accuracy in computing the result.

The conditions essential to seed germination are sufficient moisture, warmth and air. Sufficient water should be supplied to keep the seeds thoroughly moistened during germination, but they should not be allowed to rest in water. The temperature of living rooms ranging from 65° to 85° F. is suitable for germination. A place in the room should be selected where the day and the night temperatures will be fairly uniform. Thus the window sill is too cold in winter and a shelf directly over the stove is too warm. The germination of some kinds of seeds is favored by the varying day and night temperature of living rooms. Germinating seeds must be supplied with fresh air. If the air is confined, it loses its oxygen, which is necessary to germination, and there is no means for escape of carbon dioxide, a gas produced by the germination process, but detrimental to it. A proper covering of cloth, paper, wood, or glass for the seed germinator which prevents too rapid loss of moisture by evaporation, while not hindering the admission of air, should not be neglected. In order to insure sufficient air, very small seeds germinate best on top of the germinator cloth or paper, while larger seeds do better when placed between cloth or paper folds.

When sand or soil is used in testing germination, the seeds should have but a very light covering. Before the sprouts appear the surface of the sand may be kept covered to hold the moisture. Germination in sand and in soil is likely to be somewhat slower than when the test is made in cloth or paper.

Seed in the germinator should be examined daily to note the extent and vigor of germination. Weak, slow germination indicates low vitality, unpromising for good field results in plant production.

Red clover and alfalfa seed are sometimes so slow in absorbing moisture that the germination is delayed several days or even several weeks. This is particularly true of new seed. The same seed a year later may show a greatly reduced amount of this so-called ''hard seed,'' and therefore a higher percentage of germination under test. Such seed remains hard in the test when other seed has become soft by the absorption of water.

The time required for germination differs with different kinds of seed. Between the times of appearance of the first and the last sprouts there is a period of maximum germination when the practical germinating value of the seed is evident.

Determining the Actual Value of the Seed.—The actual value of the pure, germinable seed in a sample depends on its amount, as compared with the total weight of the sample. Assuming, for illustration, a standard of absolute purity and viability in seed selling at $10 per 100 pounds, such seed is actually worth, at this rate, 10 cents per pound. On the other hand, seed selling at the same price, but on test showing a purity of 80 per cent and viability of 70 per cent, contains but 70 per cent of 80 per cent, or 56 per cent of pure, viable seed. At $10 per 100 pounds of this seed as sold the good seed actually costs nearly 18 cents per pound.

This ideal state of perfection in purity and viability of seed is rarely, if ever, attained. It is important, however, to know the highest quality that seed can justly be expected to show. It is fair that the best seed that is marketed should serve as a guide in this respect, because the average results of miscellaneous tests of any particular kind are too low, since some samples are altogether too low in quality. The fact that seed of the principal forage crops in which both the purity and the viability closely approach 100 per cent does appear on the market justifies one in assuming that all seed of these crops sold as high grade should possess equally good quality.

The practical application of this understanding as to quality may sometimes admit of due allowance. For example, clover seed is sometimes sold locally in the chaff. If such seed is known to be free from noxious weed seeds, it can safely be purchased if proper allowance be made for the proportion of worthless chaff and undeveloped seed. An average sample of the chaffy seed may be weighed and its percentage of good seed ascertained. Since clover seed weighs 60 pounds per bushel, the actual value of such chaffy seed can readily be determined, the price regulated and the quantity to be sown accurately gauged.

The actual proportion of pure, viable seed in a sample is represented by the product of its percentages of purity and viability expressed in per cent.

TESTING PARTICULAR KINDS OF SEEDS.

GENERAL CONSIDERATIONS.

The work of seed testing is greatly facilitated by a general knowledge of the conditions more or less peculiar to the seed of particular kinds of crops. For illustration, the adulterants used with different kinds of seeds differ in kind; the conditions of culture, of harvesting and of preparation for market tend to influence the condition of the seed; the kind and source of the seed influence the character of its impurities. Kinds of seed supplied to the market from both domestic and foreign grown stocks should be considered with reference to their source. The significance of the kinds of weed seeds as indicating the source of the seed is at present chiefly applicable to the seed of the clovers and alfalfa.

In the following remarks on the testing of particular kinds of seeds it is assumed that the previously discussed methods of making seed tests in general will be borne in mind, leaving the present discussion to relate chiefly to conditions peculiar to the several kinds of seeds considered. To avoid repetition, it may be stated that for the test sample of clovers, alfalfa and medium-seeded grasses seed equaling 12½ BB shot in weight may be taken; of the smaller seeded redtop and bluegrasses half this weight, equal to 6¼ BB shot, will suffice; of coarse seeds (as oats, barley, vetch, etc.), double the weight of 12½ BB shot may be used. Several subdivisions of the larger sample may thus be required to segregate the small test sample. A little care will insure accuracy in weighing the test sample.

TESTING RED CLOVER SEED.[a]

The yellow and violet colors of the seed, together with the triangular form of individual seeds, distinguish fresh red clover seed. (See fig. 22.) Old seeds are dull and reddish brown. Imperfectly developed seeds are dull brown and more or less shriveled. Empty perforated seed shells in light screenings show the work of the clover seed chalcis fly.[b] No evidence of the so-called clover seed midge is ever present in seed. Note should be made of the apparent relative quantity of poor true clover seed in the sample.

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[a] See Farmers' Bulletin 260, entitled "Seed of Red Clover and Its Impurities."

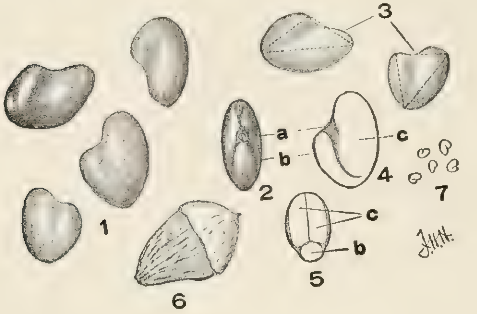

FIG. 22.—Seeds of red clover: **1**, Side view and, **2**, edge view of seeds; **3**, the triangular form indicated; **4**, a seed cut lengthwise; **5**, a seed cut crosswise, showing the embryo; **a**, seed scar; **b**, stemlet (radicle) of the embryo; **c**, seed leaves (cotyledons) of the embryo; **6**, a pod of red clover; **7**, natural size of seeds.

Consider the matter of intentional adulteration by the use of (1) old red clover seed which is sometimes disguised by oiling and polishing, but which will be disclosed in the germination test; (2) yellow trefoil seed (figs. 3 and 23); and (3) miscellaneous screenings, consisting of shriveled clover seed and weed seeds, or of very small red clover seed indicating foreign production.

Separate all true red clover seed, together with yellow trefoil present in quantity sufficient to indicate intentional adulteration, from all weed seeds and other materials.

If the sample is adulterated with trefoil or other specific adulterant, count out 1,000 seeds from the clover and adulterant freed from other impurities and determine the quantity of the adulterant by count (p. 30).

The total quantity of true red clover seed, including shriveled seed, is the "pure seed" of the test; accurately record its weight. The percentage of true red clover seed in the test sample and in the original sample is shown by dividing this weight by the weight of the original sample, expressing the result in per cent; or, if seed equal to the weight of 12½ BB shot is being tested, each $^1/_{16}$-shot weight represents one-half of 1 per cent of the whole.

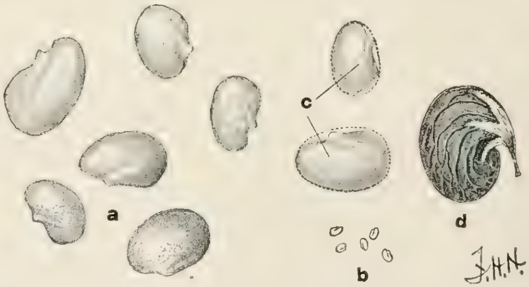

FIG. 23.—Seeds of yellow trefoil: **a**, Seeds showing variation in form and size; **b**, natural size of seeds; **c**, oval form of trefoil seeds indicated; **d**, a pod of trefoil.

Count indiscriminately from the pure seed 200 seeds in duplicate for the germination test. Conduct this test as previously directed under

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[b] See "Some Insects Affecting the Production of Red Clover Seed," Circular 69, Bureau of Entomology, U. S. Dept. of Agriculture, 1906.

"The Germination Test" (p. 30). Sprouting should begin the second day and be completed by the sixth day. At the completion of the sprouting, examine seeds which have not sprouted to determine whether they are hard or soft. In general, the presence of a considerable quantity of hard seed indicates that the sample is one of new seed. The hard seed may amount to 20, 30 or even 50 per cent in red clover seed one year old. Although such hard seed is probably all alive, it is practically worthless for seeding. Soft seeds which do not sprout may be considered as dead before the test was made. An excess of such seed indicates the use of old seed as an adulterant.

The best red clover seed tests as high as 98 or 99 per cent purity and 99 per cent viability.

The foreign seeds in red clover may include other crop seeds, as alsike clover, white clover or timothy. Note should be made of the presence, character and quantity of such crop seed.

The weed seeds should be considered with respect to their total quantity and their character as affecting the clover crop and the land. Seeds of strictly noxious plants should be distinguished as well as those indicating the domestic or foreign source of the seed. Rural school pupils, especially, who make tests of seeds, should be interested in identifying, so far as possible, the kinds of all the weed seeds found.

The noxious weed seeds found in red clover seed include: (Fig. 17) dock (**f**), black bindweed (**g**), Russian thistle (**h**), white campion (**j**), bladder campion (**k**), night-flowering catchfly (**l**), pennycress (**n**), field peppergrass (**o**), two kinds of false flax (**p** and **q**), black mustard (**s**), English charlock (**t**); (fig. 18) Indian mustard (**a**), wild carrot (**d**), field bindweed (**e**), clover dodder (**g**), field dodder (**i**), corn gromwell (**k**), rat-tail plantain (**l**), buckhorn (**m**), ragweed (**n**), wild sunflower (**p**), oxeye daisy (**q**), Canada thistle (**r**), bull thistle (**s**), wild chicory (**t**).

Other weed seeds commonly found in red clover seed include: (Fig. 19) crab-grass (**a**), witch-grass (**b**), yellow foxtail (**c**), green foxtail (**d**), velvet grass (**e**), sedge (**g**), sorred (**h**), knotweed (**i**), pale knotweed (**j**), lady's-thumb (**k**), lamb's-quarters (**l**), rough amaranth (**n**), spreading amaranth (**o**), wild spurry (**p**), two kinds of chickweed (**q** and **r**), mouse-ear chickweed (**s**), forked catchfly (**t**); (fig. 20) creeping buttercup (**a**), peppergrass (**b**), shepherd's purse (**c**), cinquefoil (**d**), hop clover (**e**), yellow trefoil (**f**), birds-foot trefoil (**g**), wild geraniums (**h**, **i** and **j**), stork's bill (**k**), spurge (**l**), spiny sida (**m**), evening primrose (**n**), red pimpernel (**o**), sticktight (**p**), forget-me-not (**q**), three kinds of vervain (**r**, **s** and **t**); (fig. 21) catmint (**a**), healall (**b**), rough-leaved toadflax (**c**), smaller broad-leaved plantain (**d**), bracted plantain (**e**), field madder (**g**), cleavers (**h**), wild corn salad (**i**), black-eyed Susan (**l**), dog fennel (**m**), field camomile (**n**), scentless camomile (**o**), cat's-ear (**q**), oxtongue (**r**), hawkweed picris (**s**).

The American or the Canadian origin of red clover seed is strongly indicated by the presence of the following weed seeds: (Fig. 17) night-flowering catchfly (**l**); (fig. 18) field dodder (**i**), rat-tail plantain (**l**), ragweed (**n**), bull thistle (**s**); (fig. 19) witch-grass (**b**), lady's-thumb (**k**), spreading amaranth (**o**); (fig. 20) peppergrass (**b**), cinquefoil (**d**), spurge (**l**), spiny sida (**m**); (fig. 21) bracted plantain (**e**). Seeds of Canada thistle (fig. 18, **r**) or of small-fruited false flax (fig. 17, **q**), if found in abundance, indicate that the source of the seed is Canadian.

European origin of red clover seed is indicated by the presence of certain weed seeds, and the occurrence of several kinds of these in the same sample (especially in the absence of the kinds heretofore mentioned as occurring in American-grown seed), lends weight to the probability of European origin, as follows: (Fig. 18) clover dodder (**g**), wild chicory (**t**; (fig. 19) wild spurry (**p**), chickweed (**q**), forked catchfly (**t**); (fig. 20) bird's-foot trefoil (**g**), wild geraniums (**h, i** and **j**), red pimpernel (**o**), forget-me-not (**q**), vervain (**r**); (fig. 21) field madder (**g**), wild corn salad (**i** and **j**), scentless camomile (**o**), oxtongue (**r**), hawkweed picris (**s**). The presence of a considerable quantity of distinctly small-seeded red clover seed further indicates European origin.

TESTING ALSIKE CLOVER SEED.

Alsike clover seed is distinguished from other kinds by its dark-green color, the small size, and the heart-shaped oval form of individual seeds. The lighter colored seeds are often mottled (fig. 24.) Old seed is distinguished from new by the dull, reddish-brown color it acquires.

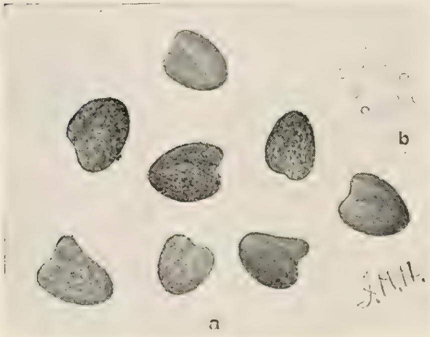

Fig. 24.—Seeds of alsike clover: **a**, Seeds showing variation in form and surface appearance, enlarged; **b**, natural size of seeds.

White clover seed often appearing in alsike seed is distinguished by its yellowish or pinkish color.

Yellow trefoil seed, sometimes used as an adulterant and often present as an incidental impurity, is coarser than the alsike seed and is further distinguishable by its greenish-yellow or brown color and the characteristic form of individual seeds (figs 23 and 24). Adulterants used other than trefoil seed are old alsike seed, timothy seed and weedy screenings (fig. 8).

Germination proceeds between the second and sixth days of the test, and the viability often attains 99 per cent. Hard seed is less frequently observed in alsike seed than in red clover. The purity commonly amounts to 98 or 99 per cent.

The noxious weed seeds occurring in alsike clover seed include: (Fig. 17) dock (**f**), white campion (**j**), bladder campion (**k**), night-flowering catchfly (**l**), pennycress (**n**), field peppergrass (**o**), small-fruited false flax (**q**), English charlock (**t**); (fig. 18) tumbling mustard (**c**), clover dodder (**g**) very rarely, rat-tail plantain (**l**), buckhorn (**m**), ragweed (**n**), oxeye daisy (**q**), and frequently Canada thistle (**r**).

Other common weed seeds in alsike seed include: (Fig 19) witch-grass (b), yellow foxtail (c), green foxtail (d), velvet grass (e), sedge (g), sorrel (h), knotweed (i), lamb's-quarters (l), rough amaranth (n), spreading amaranth (o), wild spurry (p), chickweeds (q and r), mouse-ear chickweed (s); (fig. 20) peppergrass (b), shepherd's purse (c), cinquefoil (d), hop clover (e), yellow trefoil (f), spurge (l), evening primrose (n), forget-me-not (q), vervain (t); (fig. 21) catmint (a), healall (b), smaller broad-leaved plantain (d), bracted plantain (e), dog fennel (m), field camomile (n), scentless camomile (o).

So little alsike clover seed is imported from Europe that weed seeds indicating European origin of seed are uncommon in this kind of seed. The examination of various samples of European seed shows, however, that the weed seeds found in European red clover seed, previously stated, are essentially the same as those appearing in alsike seed from the same source. Clover dodder (fig. 18, g) is particularly noticeable in most of the samples of European alsike clover seed.

TESTING WHITE CLOVER SEED.

White clover seed resembles that of alsike clover in size and form of individual seeds, but the average size is slightly smaller. The light-yellow, pinkish or light-brown color of white clover seed distinguishes it from the darker alsike. Adulteration is confined chiefly to the use of old seed and of weedy screenings. Much seed imported from Europe is on the American market.

The purity should attain 98 or 99 per cent, the viability 99 per cent; sprouting proceeds from the second to the sixth day.

The noxious weed seeds appearing in white clover seed include: (Fig. 17) dock (f), night-flowering catchfly (l), pennycress (n), false flax (p, q), English charlock (t); (fig. 18) tumbling mustard (c), wild carrot (d), clover dodder (g), rat-tail plantain (l), buckhorn (m), oxeye daisy (q), Canada thistle (r).

Other weed seeds commonly appearing in white clover seed are: (Fig. 19) witch-grass (b), green foxtail (d), velvet grass (e), sorrel (h), knotweed (i), lady's thumb (k), rough amaranth (n), wild spurry, (p), chickweeds (q, r), mouse-ear chickweed (s), forked catchfly (t); (fig. 20) peppergrass (b), shepherd's purse (c), cinquefoil (d), hop clover (e), yellow trefoil (f), wild geraniums (i, j), red pimpernel (o), forget-me-not (q), vervain (t); (fig. 21) catmint (a), healall (b), smaller broad-leaved plantain (d), field madder (g), wild corn salad (i), dog fennel (m), field camomile (n), scentless camomile (o), hawkweed picris (s).

White clover seed imported from Europe is often infested with most of the kinds of weed seeds enumerated. American-grown seed may carry seeds of (fig. 17) dock (f), night-flowering catchfly (l), false flax (q), English charlock (t); (fig. 18) wild carrot (d), rat-tail plantain (l), buckhorn (m), oxeye daisy (q); (fig. 19) witch-grass (b), green foxtail (d), sorrel (h), lamb's-quarters (l), etc. The absence of seeds usually found only in seed imported from Europe is most suggestive of the domestic origin of white clover seed.

The weed seeds fairly characteristic of European-grown white clover seed, especially when taken collectively, include: (Fig. 18) clover dodder (g); (fig. 19) wild spurry (p), chickweed (q), forked catchfly (t); (fig. 20) wild geranium (i and j), red pimpernel (o), forget-me-not (q); (fig. 21) field madder (g), wild corn salad (i), scentless camomile (o), hawkweed picris (s).

TESTING CRIMSON CLOVER SEED.

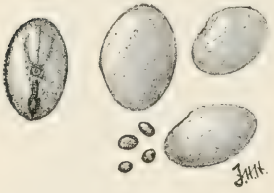

FIG. 25.—Seeds of crimson clover (enlarged and natural size).

The seed of crimson clover is larger than that of the other clovers, the individual seeds being elliptical and so slightly flattened that they roll readily on a flat surface (fig. 25). Fresh seed is pinkish and has a bright luster. As the seed ages it becomes dull and reddish brown. The viability deteriorates rapidly.

Adulteration is confined chiefly to the use of old seed, which may usually be distinguished by its color. Considerable trefoil and red clover screenings sometimes appear. Dodder occurs only in lots containing dodder-infested red clover screenings, because the crimson clover is harvested before dodder seed matures.

Most of the crimson clover seed in the American market is imported from Europe. American seed is produced chiefly in Delaware, New Jersey and Maryland. A white-seeded variety of crimson clover is imported from Europe.

The purity of this seed should be 99 per cent or higher. The viability should be 98 or 99 per cent. Very little hard seed appears in the germination test, which ranges from two to six days in duration.

The noxious weed seeds found in crimson clover seed include: (Fig. 17) chess (**c**), darnel (**d**), dock (**f**), black bindweed (**g**), corn cockle (**i**), white campion (**j**), bladder campion (**k**), night-flowering catchfly (**l**), pennycress (**n**), field peppergrass (**o**), false flax (**p, q**), ball mustard (**r**), black mustard (**s**), English charlock (**t**); (fig. 18) Indian mustard (**a**), hare's-ear mustard (**b**), wild carrot (**d**), clover dodder (**g**), field dodder (**i**), corn gromwell (**k**), rat-tail plantain (**l**), buckhorn (**m**), oxeye daisy (**q**), Canada thistle (**r**), wild chicory (**t**).

Other weed seeds commonly found in crimson clover seed include: (Fig. 19) crab-grass (**a**), witch-grass (**b**), yellow foxtail (**c**), green foxtail (**d**), soft chess (**f**), sorrel (**h**), knotweed (**i**), pale knotweed (**j**), lamb's-quarters (**l**), wild spurry (**p**), chickweeds (**q** and **r**), forked catchfly (**t**); (fig. 20) creeping buttercup (**a**), peppergrass (**b**), shepherd's purse (**c**), hop clover (**e**), yellow trefoil (**f**), bird's-foot trefoil (**g**), three kinds of wild geranium (**h, i** and **j**), stork's bill (**k**), spurge (**l**), red pimpernel (**o**), forget-me-not (**q**), vervain (**r**); (fig. 21) healall (**b**), rough-leaved toadflax (**c**), smaller broad-leaved plantain (**d**), dwarf plantain (**f**), field madder (**g**), cleavers (**h**), wild corn salad (**i** and **j**), dog fennel (**m**), field camomile (**n**), scentless camomile (**o**), corn flower (**p**), cat's-ear (**q**), hawkweed picris (**s**).

Crimson clover seed of domestic production is often characterized by the presence of one or more of several kinds of weed seeds, some of which are not considered in this bulletin. Two of these kinds, however, are spurge (fig. 20, l) and dwarf plantain (fig. 21, f). The absence of the kinds given in the following list affords strong indication of domestic production.

The weed seeds especially suggestive of European production include: (Fig. 19) chickweed (**q**), forked catchfly (**t**); (fig. 20) creeping buttercup (**a**), bird's-foot trefoil (**g**), wild geraniums (**h**, **i** and **j**), red pimpernel (**o**), forget-me-not (**q**), vervain (**r**); (fig. 21) rough-leaved toadflax (**c**), field madder (**g**), wild corn salad (**i** and **j**), scentless camomile (**o**), hawkweed picris (**s**). The presence of white seeds of crimson clover is an additional indication of European production.

TESTING ALFALFA SEED.

Alfalfa seed is distinguishable from the clover seeds by the somewhat variable kidney-shaped form of individual seeds (figs. 2, 4, 5, 6 and 26) and by the greenish-yellow or light-brown color. Old, poorly developed and shriveled seeds have a dull, reddish-brown color. In general the details of testing red clover seed (p. 33) may be followed in testing alfalfa.

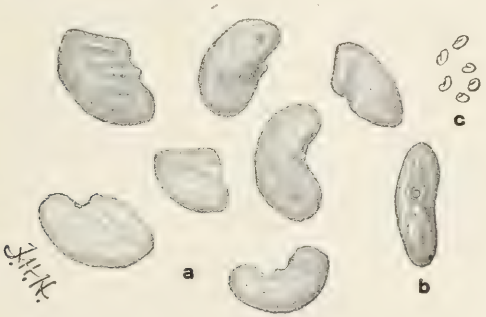

FIG. 26.—Seeds of alfalfa: **a**, Individual seeds, showing variation in form; **b**, edge view of a seed, showing the scar; **c**, natural size of seeds.

Alfalfa seed is adulterated by the use of (1) yellow trefoil (figs. 4 and 23), (2) sweet clover (figs. 5 and 27), (3) bur clover (fig. 6), (4) light, shriveled alfalfa screenings or low-grade, weedy seed.

Besides giving especial attention to the matter of adulteration, the question of domestic or of European production should be considered in making the purity test. Much of the seed on the market is imported, and the question of domestic or foreign production often can be determined by the weed seeds present.

The purity should attain 98 or 99 per cent, the viability 97 to 99 per cent. The germination test should be completed in six days, most of the seeds sprouting during the second and third days. Considerable hard seed is often found in new seed.

The noxious weed seeds found in alfalfa seed include: (Fig. 17) sand bur (**a**), wild oat (**b**), chess (**c**), quack-grass (**e**), dock (**f**), black bindweed (**g**), Russian thistle (**h**), corn cockle (**i**), white campion (**j**), bladder campion (**k**), night-flowering catchfly (**l**), cow cockle (**m**), pennycress (**n**), field peppergrass (**o**), false flax (**p** and **q**), black mustard (**s**), English charlock (**t**); (fig. 18) Indian mustard (**a**), hare's-ear mustard (**b**), tumbling mustard (**c**), wild carrot (**d**), field bindweed (**e**), clover dodder (**g**), small-seeded alfalfa dodder (**h**), field dodder (**i**), large-seeded alfalfa dodder (**j**), corn gromwell (**k**), rat-tail plantain (**l**), buckhorn (**m**), ragweed (**n**), gumweed (**o**), wild sunflower (**p**), oxeye daisy (**q**), Canada thistle (**r**), bull thistle (**s**), wild chicory (**t**).

Other weed seeds commonly found in alfalfa seed include: (Fig. 19) crab-grass (**a**), witch-grass (**b**), yellow foxtail (**c**), green foxtail (**d**), soft chess (**f**), sorrel (**h**), knotweed (**i**), pale knotweed (**j**), lady's thumb (**k**), lamb's quarters (**l**), wild saltbush (**m**), rough amaranth (**n**), spreading amaranth (**o**), wild spurry (**p**), chickweeds (**q** and **r**), mouse-ear chickweed (**s**), forked catchfly (**t**); (fig. 20) creeping buttercup (**a**), peppergrass (**b**), shepherd's purse (**c**), cinquefoil (**d**), hop clover (**e**), yellow trefoil (**f**), bird's-foot trefoil (**g**), wild geraniums (**h, i** and **j**), spiny sida (**m**), evening primrose (**n**), red pimpernel (**o**), sticktight (**p**), vervain (**r**); (fig. 21) catmint (**a**), healall (**b**), rough-leaved toadflax (**c**), smaller broad-leaved plantain (**d**), bracted plantain (**e**), field madder (**g**), cleavers (**h**), wild corn salad (**i** and **j**), poverty weed (**k**), dog fennel (**m**), field camomile (**n**), scentless camomile (**o**), cornflower (**p**), cat's-ear (**q**), oxtongue (**r**), hawkweed picris (**s**).

The bulk of the domestic alfalfa seed is produced in the Western States, and many kinds of weed seeds it carries are distinctly different from those appearing in imported seed. The weed seeds (if not associated with kinds distinctly foreign) pointing decisively to domestic production are (Fig. 17) sand bur (**a**), Russian thistle (**h**), cow cockle (**i**), fragments; (fig. 18) tumbling mustard (**c**), small-seeded alfalfa dodder (**h**), the form of field dodder (**i**) having light-colored seeds, large-seeded alfalfa dodder (**j**), ragweed (**n**), gumweed (**o**), wild sunflower (**p**); (fig. 19) wild saltbush (**m**), spreading amaranth (**o**); (fig. 20) spiny sida (**m**); and (fig. 21) poverty weed (**k**).

European origin of alfalfa is indicated by the presence of the following weed seeds: (Fig. 17) white campion (**j**); (fig. 18) wild carrot (**d**), clover dodder (**g**), wild chicory (**t**); (fig. 19) wild spurry (**p**), chickweed (**q**), forked catchfly (**t**); (fig. 20) creeping buttercup (**a**), bird's-foot trefoil (**g**), wild geraniums (**h, i** and **j**), red pimpernel (**o**), vervain (**r**); (fig. 21) rough-leaved toadflax (**c**), field madder (**g**), wild corn salad (**i** and **j**), scentless camomile (**o**), oxtongue (**r**), hawkweed picris (**s**).

TESTING ORCHARD GRASS SEED.

Orchard grass seed should be carefully mixed before the test sample is taken, because small and relatively heavier impurities are likely to settle to the bottom of the bulk sample. Seed equal to the weight of 12½ BB shot may be taken for the test sample.

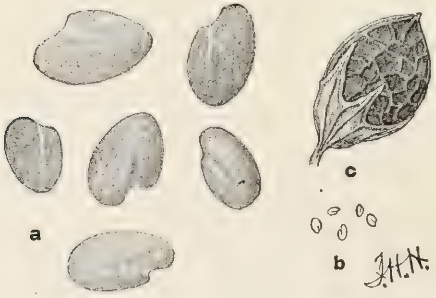

FIG. 27.—Seeds of sweet clover: **a**, Seeds showing variation in form and size; **b**, natural size of seeds; **c**, a pod of sweet clover.

Orchard grass seed is readily identified by the slender, pointed form of the seed in the chaff. The lemma of the seed is angled on the back and is curved to one side toward the pointed apex (fig. 10, a). The seeds are three-eighths inch to one-half inch long. Some of the seeds bear the sterile chaff of a second seed (middle of fig. 10, a).

Orchard grass seed is adulterated by the use of English rye-grass seed, meadow fescue seed and orchard grass chaff. The seeds of meadow fescue (fig. 10, b) and of English rye-grass (fig. 10, c) are very similar. They are about the same length as the orchard grass seeds, but are flattened and broader, not curved nor slender pointed. When seen under a magnifier the two kinds may be distinguished by the difference between the rachilla segments, that of meadow fescue being slender, cylindrical and distinctly expanded at the apex; that of English rye-grass usually wedge-shaped, flattened and scarcely expanded at the apex (fig. 11, b and c). Both of these kinds of seed often appear as adulterants of the same lot of orchard grass seed. Orchard grass chaff may be distinguished by its light weight, sometimes to some extent by its light color and by the absence of a grain as observed by pressure.

If, in making a practical test of orchard grass seed, the empty, chaffy seeds freed from other chaffy material are separated from among the grain-bearing seeds the labor is greatly increased. Such chaffy seeds may better be left with the grain-bearing seeds and indiscriminately counted for the germination test, in which the true value will appear. This test requires fourteen days. New, well-cleaned seed should germinate 95 to 98 per cent. The purity should be 98 or 99 per cent.

The noxious weed seeds found in orchard grass include: (Fig. 17) wild oat (**b**), chess (**c**), dock (**f**), including the chaffy covering, black bindweed (**g**), bladder campion (**k**), field peppergrass (**o**); (fig. 18) tumbling mustard (**c**), rat-tail plantain (**l**), buckhorn (**m**), oxeye daisy (**q**).

Other weed seeds commonly found in orchard grass seed include: (Fig. 19) crab-grass (**a**), witch-grass (**b**), velvet grass (**e**), soft chess (**f**), sedge (**g**), sorrel (**h**), lamb's-quarters (**l**), rough amaranth (**n**); (fig. 20) creeping buttercup (**a**), peppergrass (**b**), wild geranium (**i**); (fig 21) field madder (**g**), cleavers (**h**), scentless camomile (**o**), cat's-ear (**q**).

TESTING MEADOW FESCUE SEED.

Individual meadow fescue seeds are boat-shaped, three-eighths inch to one-half inch long, flattened; the lemma rounded, its apex rather bluntly pointed. The characteristic rachilla segment is slender, cylindrical, and distinctly expanded at the apex (fig. 10, b; fig. 11, b).

Meadow fescue is often adulterated with seed of English rye-grass, which is almost identical in form but may be distinguished by the rachilla segment, which is usually wedge shaped, flattened and scarcely expanded at the apex (fig. 10, c; fig. 11, c). The examination of meadow fescue seed for English rye-grass as an adulterant should always be made. The extent of the adulteration may be determined by count from 1,000 seeds of the mixture, as previously described.

The seed of chess (fig. 11, d) has been used as an adulterant of meadow fescue seed. The chess seeds are larger, usually cylindrically folded, and sometimes have a short awn at the apex. The rachilla segment is curved and club shaped.

Meadow fescue seed usually is comparatively free from meadow fescue chaff, but very poor seed may contain chaff of orchard grass or worthless orchard grass seed. The purity should reach 99 per cent, the viability 95 to 98 per cent.

The noxious weed seeds found in meadow fescue seed include: (Fig. 17) chess (**c**), quack-grass (**e**), dock (**f**), bladder campion (**k**), field peppergrass (**o**), small-fruited false flax (**q**), English charlock (**t**); and buckhorn (fig. 18, **m**).

Other weed seeds found in meadow fescue seed include: (Fig. 19) crabgrass (**a**), witch-grass (**b**), yellow foxtail (**c**), green foxtail (**d**), velvet grass (**e**), soft chess (**f**), sedge (**g**), sorrel (**h**), lady's-thumb (**k**), lamb's quarters (**l**), wild spurry (**p**); (fig. 20) creeping buttercup (**a**), peppergrass (**b**), yellow trefoil (**f**), forget-me-not (**q**); (fig. 21) bracted plantain (**e**), field madder, (**g**), cat's-ear (**q**), hawkweed (**t**).

TESTING TIMOTHY SEED.

Timothy seed is, as a rule, very pure and not subject to adulteration other than by the use of old seed. Tests of this seed are easily made.

After thorough mixing, a quantity of seed equaling the weight of 6¼ BB shot, at least, should be taken for the test sample. Timothy seed is readily identified (fig. 28). It appears both in the chaff (a) and as free grains (b). Seed in the chaff should have a silvery-white appearance. Free grains are slightly darker and dull. If they are brown a damaged condition is suggested. The purity should be 99 per cent or higher; the viability 98 or 99 per cent. The germination test requires five or six days. In addition to the weed seeds found in timothy, some lots contain Kentucky bluegrass seed and Canada bluegrass seed (fig. 9) and alsike clover seed (fig. 24).

The noxious weed seeds found in timothy include: (Fig. 17) dock (**f**), bladder campion (**k**), night-flowering catchfly (**l**), small fruited false flax (**q**); (fig. 18) rat-tail plantain (**l**), buckhorn (**m**), Canada thistle (**r**). European timothy seed is said to sometimes contain clover dodder (fig. 18, **g**), probably due to its being grown with dodder-infested clover. This dodder does not occur in American or Canadian timothy seed. The most serious impurity is Canada thistle seed found in Canadian-grown timothy.

Other weed seeds occurring in timothy seed include: (Fig. 19) witch-grass (**b**), yellow foxtail (**c**), green foxtail (**d**), sedge (**g**), sorrel (**h**), lady's-thumb (**k**), lamb's-quarters (**l**), mouse-ear chickweed (**s**); (fig. 20) peppergrass (**b**), shepherd's purse (**c**), cinquefoil (**d**), yellow trefoil (**f**), evening primrose (**n**); (fig. 21) catmint (**a**), smaller broad-leaved plantain (**d**), dog fennel (**m**), field camomile (**n**).

TESTING KENTUCKY BLUEGRASS SEED.

The Kentucky bluegrass seed in the American market is produced in this country, chiefly in Kentucky. Seed in bulk has a brownish-straw color. Individual seeds are canoe-shaped, approximately three thirty-seconds of an inch long, the back of the lemma being sharply angled. A slender ridge on each side of the angle of the lemma is usually evident (fig. 9, a).

The chief points to be considered in testing Kentucky bluegrass seed are the presence of Canada bluegrass seed as an adulterant and the presence of an undue amount of chaff or of dead seed.

Canada bluegrass seed has been employed in large quantities as an adulterant of or a substitute for Kentucky bluegrass seed. Its seed is very similar to the latter, but can be distinguished by means of a magnifier. In general Canada bluegrass seed in bulk has a somewhat lighter color. Its individual seeds (fig. 9, b) are broader, more blunt and papery at the apex, and the sides of the lemma are devoid of the ridges which are distinct in seeds of Kentucky bluegrass seeds (fig. 9, a and b; fig. 16). The extent of adulteration is determined from 1,000 seeds of the mixture counted indiscriminately.

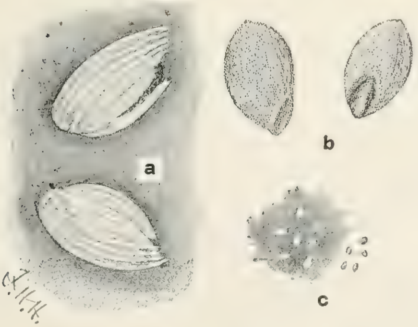

FIG. 28.—Seeds of timothy: **a**, Grains in the hull, or chaff; **b**, grains removed from the chaff; **c**, the same, natural size.

Since it is difficult to remove all the sterile chaff from seeds containing a grain, it will suffice in making practical tests to remove the lightest chaff, pieces of stems, leaves, etc., as inert matter, endeavoring to leave all the grain-bearing seeds with the pure seed, which by this method will contain also some empty, or sterile, seeds. The pure seed and chaff are separated by placing the weighed sample, a little at a time, on a smooth cardboard tray and pouring it into another tray, allowing the seeds to roll across the face of the tray. The light chaff is held behind, while the heavier grain-bearing seeds roll off. Carefully repeating the operation two or three times effects a very satisfactory separation. After removing the foreign seeds, the seeds (200 in duplicate) for the germination test are to be counted out from the "pure seed" separation, the chaffy and grain-bearing seeds being taken indiscriminately.

Kentucky bluegrass seed should be comparatively free from chaff, but the methods of cleaning in use leave from 10 to 20 per cent or more of chaff with the pure seed. Some samples show the purity ranging from 80 to 85 per cent, but most tests range from 70 to 80 per cent, and many fall much lower. The viability ranges from 80 to 90 per cent in the best samples, but most tests range from 65 to 80 per cent and many fall lower. The method of making the purity test given here tends to give higher purity and lower viability than more carefully made official tests. The most of the sprouts appear within nine or ten days, others appearing from time to time until the twenty-eighth day. Only a very light covering, if any, should be placed over the seeds. It is better that they remain uncovered on the cloth or paper if the inverted dish keeps the air about the seeds moist.

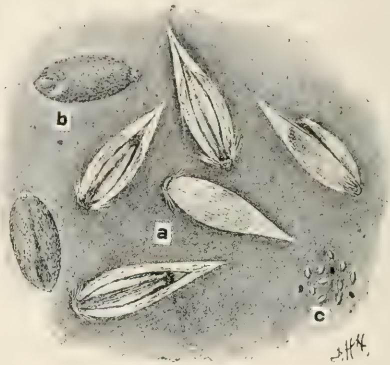

FIG. 29.—Seeds of redtop representing the "fancy" (or "solid") grade of the trade: **a**, Different views of seeds having the white, papery, inner chaff; **b**, two views of a grain, or kernel, with the inner chaff removed; **c**, the same, natural size.

The noxious weed seeds found in Kentucky bluegrass seed include: (Fig. 17) dock (**f**), small-fruited false flax (**q**); (fig. 18) corn gromwell (**k**), rat-tail plantain (**l**), buckhorn (**m**), also Canada thistle (**r**) when mixed with Canada bluegrass.

Other weed seeds found in Kentucky bluegrass seed include: (Fig. 19) sedge (**g**), sorrel (**h**), lamb's-quarters (**l**), mouse-ear chickweed (**s**); (fig. 20) peppergrass (**b**), shepherd's purse (**c**), cinquefoil (**d**); (fig. 21) dog fennel (**m**), cat's-ear (**q**), hawkweed (**t**).

TESTING REDTOP SEED.

In testing redtop seed it should be borne in mind that three grades of this seed are offered in the trade under the names (1) "recleaned" or "solid" seed, (2) "unhulled," and (3) "chaff" seed. The application of these terms becomes evident when the structure of the seed is considered. The recleaned or solid seed consists (fig. 29) of a mixture of free grains (b) and grains covered by the silvery, papery inner chaff (a). This is the best matured, purest and heaviest of the grades of redtop. The unhulled grade consists chiefly of seed inclosed in the outer chaff (fig. 30, a). This seed is generally more immature than the first grade. It also is lighter and lower in purity than the other. Chaff redtop is a very variable grade, consisting largely or almost entirely of empty chaff scales (fig. 30, a and b) and pieces of stems, leaves and other inert materials. Many samples of chaff redtop contain very little solid seed.

The recleaned grade is usually comparatively free from impurities, but sometimes contains timothy to the extent of severe adulteration, and so should be tested in this respect.

In making a practical test of the unhulled and chaff grades of redtop the lightest chaff may be blown carefully from the heaviest seed of a quantity of seed of known weight. Some seeds will retain the inclosing outer chaff, giving them the appearance shown in figure 30, a. Slight rubbing will loosen this outer chaff, when it, too, may be blown away, leaving the pure seed in essentially the same condition as shown in the recleaned grade. This seed, after removing the ergot, timothy, and other foreign seeds, may then be weighed and its quantity compared with the quantity of the original test sample. Such a comparison sometimes shows a surprisingly small quantity of true seed in chaffy grades.

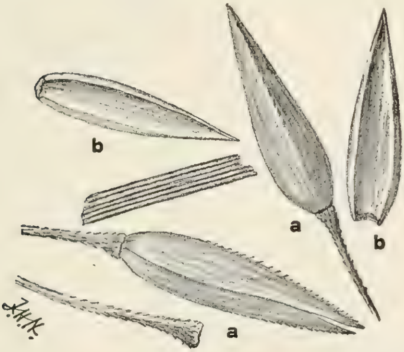

FIG. 30.—Chaff of redtop seed: **a**, Whole spikelets usually devoid of seed in "chaffy" grades; **b**, separated scales of the same; **a** and **b** represent the outer chaff of the seed. (Enlarged.)

The purity of commercial redtop seed is evidently dependent on the trade grade and the extent to which the grades are cleaned. The solid or recleaned grade should show a purity of 95 to 98 per cent. The germination should be as high. The unhulled grade is more variable both as to purity and viability. The purity is influenced by the widely variable quantity of broken leaves, ergot, and loose chaff, and the viability varies because of the practically worthless immature and undeveloped grains which constitute a variable proportion of this grade of seed.

The noxious weed seeds found in redtop (chiefly in the chaffy grades) include:. (Fig. 17) dock (**f**); (fig. 18) tumbling mustard (**c**), rat-tail plantain (**l**), buckhorn (**m**), oxeye daisy (**q**).

The commoner of the other weed seeds found in redtop seed include: (Fig. 19) crab-grass (**a**), witch-grass (**b**), sedge (**g**), lamb's-quarters (**l**), chickweed (**r**); (fig. 20) peppergrass (**b**), shepherd's purse (**c**), cinquefoil (**d**); (fig. 21) black-eyed Susan (**l**), dog fennel (**m**), field camomile (**n**).

TESTING AWNLESS BROME-GRASS SEED.

Both domestic and imported seed of awnless brome-grass (*Bromus inermis*) is in the American market. This seed should be readily recognized by its large size and thin, boat-shaped form and the light-brown color of the individual seeds. The large, thin, dark-brown grain of the seed is easily distinguished through the papery palea (fig. 11, a).

Adulteration of awnless brome-grass seed consists in the use of seed of meadow fescue and of English rye-grass (fig. 11, b and c). The seed of chess, or cheat, sometimes passes in the trade as awnless brome-grass seed. These two kinds of seed are closely related botanically, but they are readily distinguishable under careful observation (fig. 11, a and d).

One objection to the use of brome-grass seed imported from Europe is that it carries the seed of quack-grass (fig. 17, e). Unfortunately in respect to popular seed testing, awnless brome-grass seed produced in the Northwestern States and in Canada may carry seed of wheat-grass which is so similar to that of quack-grass that the layman is not likely to distinguish them with certainty.[a]

The number of kinds of weed seeds carried by awnless brome-grass seed is comparatively small, but some of them are very undesirable.

Awnless brome-grass seed should show purity of 98 or 99 per cent and viability of 90 to 95 per cent in fourteen days.

The noxious weed seeds found in this seed include: (Fig. 17) wild oat (**b**), chess (**c**), quack-grass (**e**), black bindweed (**g**), pennycress (**n**), field peppergrass (**o**), large-fruited false flax (**p**); and field bindweed (fig. 18, **e**).

Other weed seeds sometimes appearing in awnless brome-grass seed include: (Fig. 19) soft chess (**f**), lady's-thumb (**k**), lamb's-quarters (**l**), rough amaranth (**n**); (fig. 20) yellow trefoil (**f**), sticktight (**p**); and cleavers (fig. 21, **h**).

European origin of awnless brome-grass seed is strongly suggested by the presence of seeds of quack-grass (fig. 17, **e**), false flax (fig 17, **p**), field bindweed (fig. 18, **e**), and soft chess (fig. 19, **f**).

TESTING SEED OF MILLETS.

The millets used as forage crops in this country represent three distinct kinds of grasses—the broom-corn, or grain, millets (fig. 31, a), the foxtail millets (German, common and Hungarian (fig. 31, b), and the barnyard and Japanese millets (fig. 31, c). The seed test should show which kind is involved.

Seeds of the broom-corn millets (fig. 31, a) are mostly free from the brown, papery, loose-fitting chaff; they are broadly oval, robust, highly polished, shining and tend to roll readily on a plane surface. The color varies in different varieties and includes straw-color, light yellow, orange, gray and dark brown.

Seed of the foxtail millets (fig. 31, b) appears both with and without the thin, whitish, outer chaff, most of the seeds being free from it. With the outer chaff removed, the seeds present a finely roughened, or stippled, surface which has a slight luster. German millet seeds usually are broadly oval, robust; they roll readily and are commonly orange colored. Common millet seeds are oval, but relatively longer in proportion to their width than seeds of German millet; yellowish or greenish in color. Hungarian millet seed consists of a mixture of yellow or golden colored seeds and of dark-purple seeds. The darker seeds are often mottled. Seeds of the foxtail millets, particularly those of common millet, are distinguishable from the similar seeds of the weed, green foxtail (fig. 19, d), by their slightly larger size and more polished surface.

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[a] Circular No. 73 of the Bureau of Plant Industry points out the distinguishing characters of the seeds of quack-grass, slender wheat-grass, and western wheat-grass.

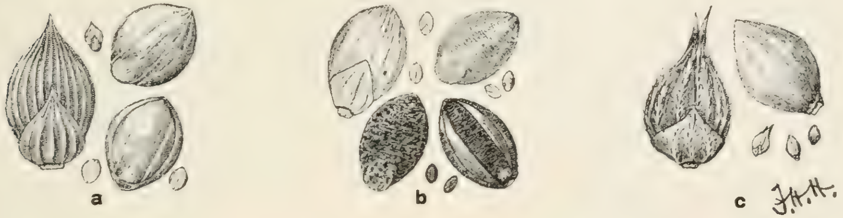


FIG. 31.—Seeds representing the three groups of millets: **a**, Broom-corn millet; **b**, foxtail millets, including the German, common, and Hungarian varieties; **c**, barnyard and Japanese millets. (Enlarged and natural size.)

Seed of barnyard millet, including that of Japanese millet (fig. 31, c), is chiefly inclosed in the light-brown or dark-brown, hairy, sharp-pointed outer chaff. With this chaff removed, the seed is oval, whitish or gray, smooth and polished, plano-convex, the convex face strongly arched (fig. 31, c).

The purity of all the millets should reach 99 per cent, the viability 95 per cent or higher in three to five days.

Much of the seed of all the millets used in this country, excepting possibly the common barnyard millet, is imported, and many kinds of injurious weeds are thus introduced. This is particularly true of the broom-corn and foxtail millets. About the same kinds of weed seeds are carried by each.

The noxious weed seeds found in broom-corn millet include: (Fig. 17) dock (**f**), black bindweed (**g**), corn cockle (**i**), night-flowering catchfly (**l**), cow cockle (**m**), pennycress (**n**), ball mustard (**r**), English charlock (**t**); (fig. 18) Indian mustard (**a**), hare's-ear mustard (**b**), tumbling mustard (**c**), field bindweed (**e**), corn gromwell (**k**), rat-tail plantain (**l**), buckhorn (**m**), wild sunflower (**p**), Canada thistle (**r**), wild chicory (**t**).

Other weed seeds commonly found in broom-corn millet include: (Fig. 19) crab-grass (**a**), yellow foxtail (**c**), green foxtail (**d**), soft chess (**f**), sorrel (**h**), knotweed (**i**), pale knotweed (**j**), lady's-thumb (**k**), lamb's-quarters (**l**), rough amaranth (**n**), spreading amaranth (**o**), wild spurry (**p**); (fig. 20) creeping buttercup (**a**), red pimpernel (**o**), sticktight (**p**), vervain (**r**); (fig. 21) healall (**b**), cleavers (**h**), dog fennel (**m**), field camomile (**n**).

TESTING SEED WHEAT.

A practical test of seed wheat may be made in which the points to be considered are the quantity of shriveled, or ''pinched,'' grains, the presence of bunt, the quantity and character of the weed seeds, and the viability of the plump grains.

After thorough mixing of the bulk sample, a quantity of seed equaling the weight of 12½ or even 25 BB shot may be taken for the test sample. This should be separated into plump, well-filled, large grains and shriveled, small grains.

While making this separation the presence or absence of bunt, or diseased grains, should be noted. Such grains are somewhat above the average size of the best grains, brown in color, soft, and show a blackened interior when broken open. Seed fit for sowing should be plump and well filled; it should show at least 99 per cent purity and 99 per cent viability in three days and be free from bunt.

The noxious weed seeds found in wheat include: (Fig. 17) wild oat (**b**), chess (**c**), darnel (**d**), quack-grass (**e**), dock (**f**), black bindweed (**g**), Russian thistle (**h**), corn cockle (**i**), cow cockle (**m**), pennycress (**n**), field peppergrass (**o**), false flax (**p**), ball mustard (**r**), black mustard (**s**), English charlock (**t**); (fig. 18) Indian mustard (**a**), hare's-ear mustard (**b**), tumbling mustard (**c**), field bindweed (**e**), corn gromwell (**k**), ragweed (**n**), the similar (but larger) seeds of giant ragweed, wild sunflower (**p**), Canada thistle (**r**), bull thistle (**s**), and the whitish or pinkish bulblets of wild garlic which are sometimes very abundant in wheat grown in the Eastern States.

Other weed seeds occurring in wheat include many of those found in forage-crop seeds. This is particularly true of wheat which has been poorly cleaned.

A test of a poor grade of wheat along the lines suggested should convince any farmer of the value of the fanning mills and suitable screens used in grading seed wheat.

TESTING SEED OATS AND BARLEY.

Seed of oats and barley may be tested in general as outlined for wheat. In testing oats especial attention should be given to the possible presence of seed of wild oat (fig. 17, b), which can be recognized by its brown color, the brown hairs at the base of the seed, the bent awn at the back, and especially by the expanded, cup-shaped scar at the base of the seed.

The purity of oats and barley should reach 99 per cent, the viability at least 95 per cent for oats and 98 or 99 per cent for barley.

In general the weed seeds appearing in wheat may be expected to appear in poorly cleaned oats and barley.

TESTING FLAXSEED.

Properly cleaned flaxseed should be practically free from impurities, thus showing a purity of nearly 100 per cent. The viability should reach 99 per cent or higher in two or three days. Both domestic and imported seed are in the market. Poorly cleaned grades contain many kinds of weed seeds which, in general, include most of those found in millet seed and in wheat. In a test of flaxseed especial attention should be given to the discovery of seed of flax dodder. As shown in figure 12, some of these dodder seeds are double and thus fail to pass a sieve which will remove most of the single seeds. Fairly well-cleaned lots of flax are thus likely to contain these double seeds of dodder. Much of the imported flaxseed contains seed of flax dodder. The very destructive nature of this dodder justifies every effort to prevent the introduction of its seed. Seed of false flax (fig. 17, p) is a common noxious impurity which should be avoided.

TESTING WINTER RAPE SEED.

Popular tests of rape seed are not likely to be wholly satisfactory because of the difficulty in identifying with certainty the seeds of the different kinds of rape and the closely allied mustard weeds. Seed of the more important winter, or Essex, rape may generally be recognized by the relatively large size of the individual seeds (somewhat larger than those of summer rape or of turnip), by their steel-black color, and their roundness, allowing them to roll readily on a plane surface. Summer rape seeds are mostly smaller, consisting of a mixture of black and reddish seeds, some of the black seeds being distinctly pitted, or nearly all the seeds reddish. Some lots of seed, particularly of summer rape, are adulterated with seed of English charlock (fig. 17, t). As a rule, the charlock seeds may be distinguished by their smaller size, more nearly spherical form, their smoother surface and by the presence of mature reddish or brown seeds with the black ones. Some lots of rape seed are heavily adulterated with seed of Indian mustard (fig. 18, a). These seeds are readily recognized by their uniformly reddish-brown color and by the netted or pitted surface as seen under a magnifier. The purity of winter rape should be 99 per cent or higher, the viability as high under a test of two or three days' duration. A miscellaneous series of weed seeds, most of which are previously described and figured, is likely to appear in poorly cleaned grades of rape seed, particularly the summer variety.

TESTING VETCH SEED.

A popular test of vetch seed consists chiefly in distinguishing the seed of hairy (winter) vetch and that of spring vetch, and determining the viability.

Winter vetch seed (fig. 32, a) consists of nearly spherical, steel-black seeds showing some variation in size. The seed is distinguished from other kinds by its characteristic seed-scar which is oblong-oval with a whitish slit through the center. A small protuberance (the chalaza) of the seed coat is located nearly the length of the scar distant from the narrower end of the scar, as shown in the figure.

Seeds of spring vetch represent several varieties and thus are variable in size, form and surface. The characteristic scar is wedge-shaped with a slender, black slit through its center, the slightly raised margins of the slit usually being light colored. The usually distinct chalaza, as a rule, is about half the length of the scar distant from the narrower end of the scar (fig. 32, b). Some seeds of spring vetch are large, compressed, and somewhat angular; others are nearly spherical and smaller. The surface is black, brown, gray or mottled. In one variety, a common impurity of winter vetch seed, the seeds are spherical, jet-black and about the size of the smaller winter vetch seeds. Only careful examination under a magnifier discloses their darker color and characteristic scar, in which, however, the margins of the scar slit are black. In testing seed of winter vetch the seeds of this variety of spring vetch should be sought especially. Seeds of other varieties of spring vetch are usually distinguishable from winter vetch seeds by their different form or color.

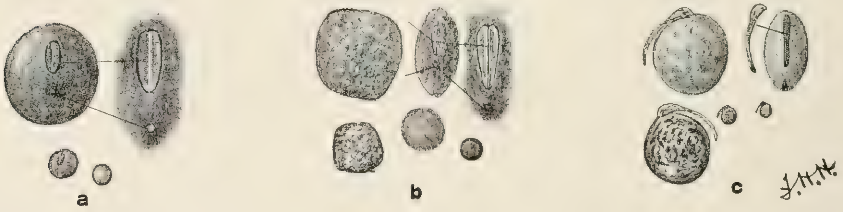


FIG. 32.—Seeds of three kinds of vetch: **a**, Winter (or hairy) vetch; **b**, spring vetch; **c**, wild vetch (*Vicia hirsuta*). (Enlarged and natural size.)

Various weed seeds, mostly of the class appearing in seed of millets and cereal grains, are sometimes present in poorly cleaned vetch seed. The seed of a wild species of vetch (*Vicia hirsuta* (L.) Koch, fig. 32, c) is a common impurity of cultivated vetch seed.

Vetch seed should show nearly 100 per cent purity. The viability of commercial seed is variable and is strongly influenced by the hard seed, especially in the case of winter vetch in which the hard seed may amount to 30 per cent or more. In spring vetch the hard seed usually varies between 5 and 15 per cent. The sprouting of the hard seed is hastened in the test by cutting through the seed coat with a knife blade, thus admitting moisture. The coat should not be cut in the vicinity of the seed scar lest the embryo be injured.

The germinable seed in high-grade lots of commercial winter vetch seed, together with the variable quantity of hard seed, ranges from 95 to 98 per cent. Some lots germinate between the second and sixth days; others during the second week of the test.

In spring vetch viability of 95 to 98 per cent is less commonly reduced by the hard seed. Sprouting takes place chiefly between the third and fifth days.

TESTING SEED CORN.

The testing of seed corn so far as it corresponds to the tests applied to seed of other crops consists chiefly of the germination test, showing how much of the seed will germinate and with what vigor. Assuming that the corn to be used for seed is in the ear and has been selected with reference to variety and in conformity with the recognized type of ear and of kernel best adapted for crop production, it remains to test its viability.

The two types of germinator adapted for this work have already been referred to (p. 14). After removing sufficient of the butt and tip kernels of the ear to leave on the cob kernels of uniform size, 6 kernels are removed for test. Of these 2 are taken from near the butt, 2 from the middle and 2 from near the tip. Each pair of kernels should be taken from opposite rows, these rows being one-third of the circumference of the ear apart. In this way fairly representative kernels of the ear are chosen. The kernels are placed side by side, germ side uppermost, in the marked squares of the germinator, which are numbered serially, the ears furnishing the kernels for the squares being numbered correspondingly. This is an individual ear test. Every seed should germinate, thus showing viability of 100 per cent. If any of the kernels of an ear fail to germinate, that ear should be discarded. If the germination for any ear is weak, producing inferior sprouts or is unduly slow, the ear should be rejected. The character of the sprouting should be apparent in five days.

SUMMARY.

(1) It is important that farm seeds be tested before they are sown.

(2) Seed testing in its essential features giving practical results can be done more easily than is generally believed.

(3) By means of a seed test the actual value of seed in question as compared with seed of the best quality can be determined and damage to the crop or the land due to noxious weed seeds can be avoided.

(4) Practical seed tests can be made with simple equipment by any one interested in the purchase or use of seeds.

(5) It is readily possible for the farmer to make practical tests of seeds, thereby safeguarding against partial or complete loss of crops.

(6) Seed testing is admirably adapted for practical exercise work in elementary agriculture in rural schools.

(7) The essential preparation for making seed tests consists of providing the simple apparatus necessary and of becoming familiar with the general purposes and methods of testing and the features of importance peculiar to tests of particular kinds of seeds.

THE QUAIL, THE FARMER'S FRIEND.

(Extracts from speech of Senator Francis M. Wilson of Platte county, delivered in the Missouri State Senate, March 7, 1911, in support of his bill to prohibit the killing of quail, "Bob White," for three years. Senator Wilson's remarks were entirely extemporaneous, but at our request he has attempted to reproduce some of his speech which excited State wide attention. The Globe-Democrat said, "The 'Woody-Dell' speech of United States Senator James A. Reed was surpassed and Vest's eulogy of 'The Dog' was rivaled in the State Senate this afternoon when Francis Murray Wilson delivered a tribute to the quail which converted a hostile body and passed a bill preventing the killing of the partridge for three years." The Republic said, "Moved by the eloquent appeal of Senator Francis M. Wilson of Platte county to save the elusive quail from extermination, the Senate this afternoon voted to close the hunting season on quail for three years." The proposed law passed the Senate, but failed of passage in the House.)

Senator Wilson.

The quail is among the most ancient of game birds. In some form, differing in habits and appearance, gay with the plumage of sunny climes, or grave with the subdued colors of cheerless landscapes, it has been found throughout the world. If we search for its origin, the mists of antiquity obscure its first appearance among the children of men. The Bible tells us of the Almighty furnishing this toothsome bird to nourish and strengthen the Israelites in their combat with the trials of the wilderness, and in all ages it has given the historian his brightest glimpse of bird life, and the poet inspiration for his sweetest song. The name given this royal bird differs with the locality and folklore of the people, but throughout the eastern states, from the pineries of Maine to the flowery fields of Florida, and westward to the foot-hills of the mountains, it is known as "Bob White"—the true name of this species adopted by ornithologists. And so it is, for the protection and preservation of this messenger of civilization, proud aristocrat of farm and field and orchard, that I press this measure upon the Senate.

Senators from favored sections of the State, where these birds are fairly plentiful, argue that to enact such a law would be unjust to their constituents. In this I find no comfort for them, but one of the strongest arguments favoring the passage of the bill. History repeats itself. Within the memory of some of my distinguished colleagues, the princely domain which I represent was indeed a "hunters' paradise." Deer broke covert from every brake; wild pigeons clouded the sun as vast flocks passed from feeding to roosting places; wild turkeys in almost countless numbers were everywhere; prairie chickens abode with us in contentment; wild geese—harbingers of coming fall and spring—covered the sandbars of our rivers, or on mighty wing rushed through the air, but—

> "There is a Power whose care
> Teaches thy way along that pathless coast,
> The desert and illimitable air,
> Lone wandering, but not lost."

How the change doth vex us! Sad is the retrospect. In secluded places, scattered far and wide over a limited section of the State, the deer are making their last gallant stand; wild pigeons live only in the glorious traditions of our great commonwealth; the prairie chicken is now *rara avis,* and the wild goose calls in alarm his scattered few as high above their would-be murderers they cleave the blue of the skies, hastening to the few remaining asylums of peace in the far away southland or in the frozen regions of the north. So it has been given to me to witness the almost incredible destruction of this valuable game, not at the hands of true sportsmen, who have long waged unequal battle to stay the wholesale and inexcusable slaughter, but to satisfy the inordinate appetite of the "game hog" and his foster brother, the "pot hunter," who slew—and still slay—that they may boast of the cruel carnage wrought and to furnish a precarious living for the market hunter who stains himself with the butchery of these creatures God Almighty gave to bless the lives of men. Senators, what is true of my section of the State will be in a few years the sad story you will have to tell of man's inhumanity to game life. It will then be everlastingly too late to repine. "The moving finger writes; and having writ, moves on: nor all your piety nor wit shall lure it back to cancel half a line, nor all your tears wash out a word of it." Let us not longer impede the steps of tardy legislation, but plant our standards close about this finest of American game birds.

What a splendid fight the Bob White is making against the combined hosts of his enemies, and what a fine battle the farmers of my district are waging to save him from extinction. None know better than the farmer and orchardist the incalculable benefit he is to field, garden and orchard. From "early morn' 'til dewy eve," bright of eyes and swift of legs, the Bob Whites are busy with the destruction of noxious insects and weed pests. He is not regarded as a trespasser, but is entertained as a royal guest, whose stay would be indefinitely prolonged. True it is, that it has taken science a long time to discover what our agriculturists have known about the value of this bird as his chief assistant among the feathered tribe, but it is making up its silence now by proclaiming its virtues from the housetops. It is officially recorded that examinations of many hundreds of stomachs and crops of these birds disclose them crowded with the seeds of noxious and troublesome weeds, his diet for almost half the year. Upon this a Government report says: "It is reasonable to suppose that in the states of Virginia and North Carolina from September 1 to April 30 there are four Bob Whites to each square mile of land, or 354,820 in the two states. The crop of each bird holds half an ounce of seed and is filled twice a day. Since at each of the two daily meals weed seeds constitute at least half the contents of the crop, or one-fourth of an ounce, a half ounce daily is consumed by each bird. On this basis, the *total amount of weed seeds consumed by Bob Whites from September* 1 *to April* 30 *in Virginia and North Carolina amounts to* 1,341 *tons.*" May I inquire what the harvest of weeds would have been had each of these seeds produced its own? Does not this plead trumpet-tongued in his defense? But this is not all science teaches us of the aid this bird is giving all classes of those who toil that we may live. Where insects abound, Bob White plays no favorites in his labors of extermination. Alike he wars upon the chinch bug, the grasshopper, the potato bug, the cotton-boll wevil, the codling moth and other devastating bugs and insects. In a letter to the Department of Agriculture touching the voracious appetite of this bird for such pests, a gentleman from Kansas writes: "On opening the crop we found about two tablespoonsful of chinch bugs," and when a consultation of authorities discloses that this bug has cost the farmers at least 100 millions of dollars per year, you may well stand aghast at the formidable array of facts and figures—which admit of no dispute—that Bob White, above all his feathered brothers, is entitled to the proud name of the *farmer's friend.*

It is not alone for gain that this bird is so firmly fixed in the affections of the farmer. Incense to its many other virtues rise from countless thousands of happy homes all over this imperial empire of ours. Rich in sentiment, with ear attuned to Nature's symphonies, the farmer revels in the music Bob White contributes to the melody of its grand harmony. No bright tinted troubadour of the air, flashing here and there like a thing of light, his gorgeous breast almost bursting with rich excesses of song, charms him from the seductive call of his best loved bird friend. Spring has come. Here and there dead branches are quickening into life; buds burst into leaf; the brown patches of earth again become the nursery of tender grasses and modest flowers, and all Nature is yielding to the annual miracle which heals the scars on Winter's grave with the sweet assurance "that we, too, shall live again." From afar, soft as the low notes of a flute, its sharp, staccato whistle, changed by the witchery of the season into the coy notes of love's first story, comes "Bob White! Ah! Bob White!" Again the music of his soul changes. The shy wooer of the demure little lady nearby becomes bold as a knight errant, and as his jealousy and ardor keeps pace, from stump or rail or broken thicket branch or wherever her eyes, kindling with the fires of coming allegiance, will fall upon his knightly bearing, or ears hear his ardent protestations, again the call, but now the ringing defy of the mail-clad warrior ready to do battle in the lists for his lady love. The theatre of his song changes with the coming of June, life's time of thrift. The covenants of Spring have been redeemed, and Summer sings of the fatness of field and vine in the glorious Autumn. While the dew is yet wet on the green of the leaves and gold of the flowers, Bob White banishes sleep with his insistent call, "Wheat's ripe! wheat's ripe!" His faithful mate is not far away. In some neglected spot where security abounds she is busy with the duties of maternity and again his chuckling notes, "All's well! all's well!" as from "the orchard, the meadow, the deep tangled wildwood," he gives full throated utterance of his ecstatic joy. What is more charming to the ear than the music of the quail, wafted from wheat shocks as the rays of the rising sun turn from orange to gold the "beauty of the valleys and the glory of the hills." It surpasses the ripple of the brook, which poets say is Nature's grandest melody. The tenderest memories of my happy boyhood days are linked with hazy summer, when the air was freighted with the perfume of flowers, fruits and berries, and the cheery whistle of "Bob White" rang through the old orchard. Through the years come hymns of happy reapers singing in seas of shimmering grain, the sound of bells, tinkling the way of homeward plodding herds and from the fields the voices of the toilers chanting the dirge of dying day and mingling with it all Bob White's musical farewell, as fading light slips down the cloud-isles of the sunset.

"Dies the day, and from afar away,
  Under the evening stars,
Dies the echo as dies the day,
Droops with the dew in the new-mown hay,
Sinks and sleeps in the scent of the May;
  Dreamily, faint and far."

Mr. President, I am a devotee of the rod and gun, and from the standpoint of a sportsman—which I claim to be—my pulse always beats quick and fast when I behold that seed time has past, and the fruitage of the earth has come to its own. Under the spell of Nature's enchantress, September and October are mighty flower gardens rioting in the blazonry of bloom. "Magnificent Autumn! He comes not like a pilgrim clad in russet weed; he comes not like a hermit clad in gray. But he comes like a warrior with the stain of blood upon his brazen mail. His crimson scarf is rent. His scarlet banner drips with gore." The call, "Bob White," is silent, but from stubble, pasture, tangled copse, and corn fields, standing rank on rank like Hussars in their uniforms of gold and silver and wherever his fancy leads, we now hear his peculiar covey call. It falls upon the impatient ear of the sportsman with unmeasured delight. Tired of the grind of the busy mill of business, the weary sentinels of the fortress of his brain give warning that it is only the wine of Nature which quickens the sluggish blood; will bring new light to care-worn eyes, and paint the pallid cheek with the ruddy glow of health. As he fills his pockets with shells, his faithful dog leaps about him, eager to match his gift of nose with the cunning of this winsome bird. The east is already crimson with the coming of a perfect day. The Frost King has scattered his jewels with lavish hand, and from bough and twig and stiffened blade of grass, like diamonds in the corona of Queens, they glow and flash with many colored fires, heralding the growing glory of the sun. Bob White is ready for him in perfect strength of wing and limb, feeling assured that if these fail, his mimicry of plumage with his surroundings may defeat the "tainted gale," as pointer or setter ranges far and wide in search of it. But not so. There is a stiffening of the muscles. Like an exquisitely carved statue, fresh from the hands of a master, the dog "stands." There is a roar of wings, the air is full of smoke. Again the quest is taken up, and so through the hours of the too short day, over hill and plain, with few birds perhaps, but with renewed health and strength, the weary hunter turns homeward. The day is done. Lights appear as he draws near home. Loved ones run to meet him at the gate, their faces shining with expectant hope as they inquire, "What luck?" As he turns to enter man's only asylum of perfect rest there comes faintly the covey call again, as—

"Shrill and shy from the dusk they cry,
Faintly from over the hill;
Out of the gray where shadows lie,
Out of the gold where sheaves are high,
Covey to covey, call and reply,
Plaintively, shy and shrill."

THE BEAUTIES OF HA-HA-TONKA.

During the session of the Forty-sixth General Assembly of Missouri Senator T. J. Feaster introduced a bill providing for the purchase of Ha-Ha-Tonka, a tract of some 7,000 acres in Camden county. The proposed plan was to pay for the park out of a portion of the yearly revenues collected in the game protection fund. The bill failed of passage, as did a somewhat similar measure introduced in the National Congress by Hon. D. W. Shackleford, a few years ago, but the agitation served to call the attention of the people of the State and nation to one of the most beautiful spots in America. It was of this place that Bayard Taylor said, ''I have traveled all over the world to find here in the heart of Missouri the most magnificent scenery the human eye ever beheld.''

E. T. Grether wrote as follows in the St. Louis Daily Globe-Democrat of January 29, 1911:

Looking West from Tower

Lake, Automobile Garage and Mansion, With Partial View of Grounds.

''Ha-Ha-Tonka Park is situated in Camden county, Missouri, twenty-five miles north of Lebanon, Missouri, which lies a little more than halfway across the State southwesterly from St. Louis on the Frisco railroad.

''In Ha-Ha-Tonka Park the residents of Missouri will acquire a resort equal in beauty to the fairest parts of Switzerland, and offering opportunities for sport of the most attractive character, unexcelled in the whole country, a place where the angler and hunter can find conditions superior to those in the Adirondacks, the climate practically perfect, the air splendidly invigorating, the water the purest product of nature, and the scenery such as to arouse the admiration of artists who have seen all there is to be seen in this country and Europe.

"While the acquirement of this State park will afford opportunities for healthful, wholesome pleasure, the property, in itself, will become a valuable holding on account of the water power, the use to the State for fish culture, game propagation, the actual value of the land, the timber, valuable deposits of high-grade, cream-colored stone; lime and sand supply; a rough, cut-stone mansion, built at an outlay of $100,000; a rough, cut-stone garage, at a cost of $25,000; a stone water tower; a nine-room frame hotel, six room cottage, a postoffice and general merchandise store, a complete sawmill plant with full planing mill equipment; a drying room containing lumber cut from native trees, a large frame barn, a grist mill and a pump house. Four hundred acres of the property is well fenced and under cultivation, with greenhouses, etc.

Looking Down Trout Glen, Almost 500 Feet Below Top of Bluff.

"The park has been wonderfully endowed by nature. It has rainbow trout of from 2 to 10 pounds, scrappy small-mouth bass and giant crappie in waters that originate in a spring that comes out of a gorge 200 or 300 feet high, and of an inexhaustible supply which flows through Trout Canyon, forming cataracts like the Columbia river until it empties into Ha-Ha-Tonka lake, the largest lake in Missouri. This latter surrounds an island of thirty acres or more, and flows on to Ha-Ha-Tonka river and then into the famous Niangua river, all of which are in the proposed Ha-Ha-Tonka State Park.

"It is stated by engineering experts that a flow of 360 feet per second, or 31,000,000 cubic feet every hour, is estimated for Ha-Ha-Tonka Spring. This can be made a considerable source of revenue, which will gain in value as the natural power resources of Missouri become more widely known. None of this power will be less appreciated if the disciple of Izaak Walton should also enjoy the rare sport of fly or bait casting on these same waters as his boat floats down the crooked twists and turns of the river to some point where, within less than a mile, the boat can be again placed in the river at its starting point. The waters of Ha-Ha-Tonka are particularly spoken of because of their extent and their beautiful setting, but in many picturesque mountain vales and uplands there are also natural springs throughout the grounds. Among other beauties and wonders is a remarkable subterranean stream, which has flowed for centuries, formed along its course great caverns of white onyx, stalagmites and stalactites. These glittering formations compose the floor and ceilings of retreats 200 feet wide or more, and a hundred feet high. A chain of these unexplored caverns promises the greatest of interest to the ordinary visitor as well as the scientist.

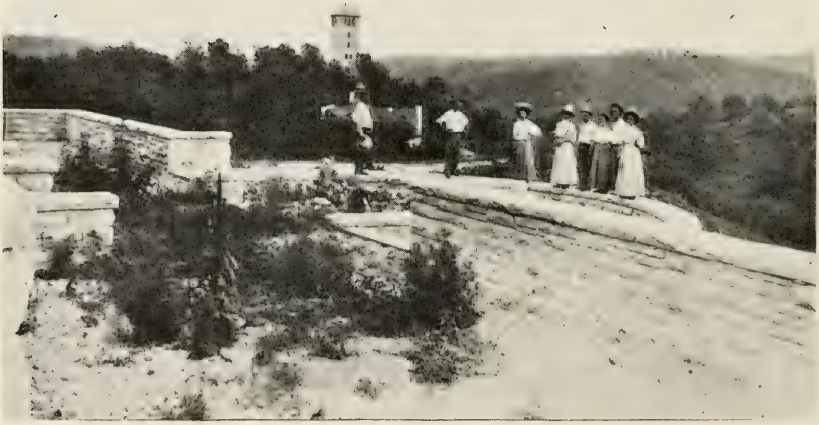
"In early days, before the white man had placed his feet on these wonderful premises, the North American Indians are said to have used these grounds for their great gatherings.

"Proceeding across a natural bridge in the park, which is 100 feet in height, 80 feet in width and 50 feet in thickness and of sufficient strength to permit a freight train to be hauled over it, if such were tried, the visitor comes to an immense natural coliseum, protected on all sides by solid walls 200 feet high, modeled and carved by the agencies of nature. Here it would be possible for 50,000 persons to gather in this great natural amphitheater for any purpose. A whispering dell, where the smallest sound is audible, is another cause of wonderment to the visitor. There is wild and fascinating scenery everywhere. It is said that this wonderful tract of land was at one time urged as a National park to be set aside by Congress."

In July, 1908, the present Assistant Secretary of the Missouri State Board of Agriculture visited Ha-Ha-Tonka with a party of friends, driving a distance of twenty-eight miles from Bagnell, terminus of the Jefferson City and Bagnell branch of the Missouri Pacific railroad. Returning, the party drove forty miles to Versailles, where ends the Boonville and Versailles branch of the Missouri Pacific, and which town is also on the Rock Island railroad. The following are extracts taken from a descriptive article written a few weeks later:

"Ha-Ha-Tonka—it is Missouri's wonderful playground. There's something in this quaint Indian word, said to mean laughing waters, which makes you want to know more of it. The Ha-Ha-Tonka region is in Camden county, on the southern slopes of the Ozarks.

"The late R. M. Snyder, who on October 31, 1906, met his death in an automobile accident in Kansas City, chose this wild and wonderful spot, deep in the recesses of a rugged region and inaccessible to a marked degree, as a place where he could build an ideal home far removed from the marts of men.



At Sunset—Members of Camping Party on Walls near Mansion.

"Mr. Snyder commenced improving the place in March, 1905, and at the time of his death the improvements were well under way, yet far from completed. Everyone who visits Ha-Ha-Tonka is surprised at the extent of the improvements planned, the estimated cost being $300,000. The pay roll at one time amounted to $1,100 per week.

"The location of the mansion—such it is called and so it is—is on a high hill, once the site of an Indian burying ground. Many skeletons were unearthed when the excavation for the building was made, and tomahawks and other implements of Indian warfare are yet found. Standing on the rock wall on the south side of this building, one may drop a rock over the bluff, which rises almost perpendicularly, and later see it splash in the seething waters of the wild mountain stream which goes bounding through Trout Glen, hundreds of feet below. The mansion, 85 by 115 feet, and three stories in height, besides the full sized basement, is of sandstone, quarried a quarter of a mile away and 800 feet below the site selected for the mansion. By use of a hoisting engine, the stone was then hauled up the heights on a miniature railroad. Almost all the material used in the construction of the mansion, stables and water tower, all of which are of stone, was obtained on the place. There the lime was burned, there the sand was made of two kinds of ground rock, and there the oak timber for the immense joists, 12 by 14 inches, was cut. The buildings are practically fireproof.

The Mansion, 85 by 115 Feet, Built of Native Stone.

"In the mansion are twenty-eight large rooms and many smaller ones—about 60 in all. The entire building is wired for electric lights and piped for water and gas, 7,000 feet of the best piping having been placed in position. Immense furnaces in the basement supply the heat. Rooms had been planned for the various members of the family. Then there are guest rooms, smoking rooms, billiard halls, banquet halls, etc., each facing on an enclosed central court extending from first to topmost floor. Mr. Snyder had selected his own suite of rooms on an upper floor and in the southwest part of the building. From the windows one catches a view of unsurpassed and indescribable loveliness and grandeur. From here he sees the sun sink behind the blue ridges far beyond, lighting with tenderest glow the lake below and, a little later, as the day dies, kissing good bye to the heights on sunset hill, the highest point for many miles.

"To the west of the mansion are the greenhouses—five buildings—two of which are 25x120 feet and three 20x50 feet. The boilers and pipes are in place, and the thousands of panes of glass are on the ground, ready for the frames.

Balanced Rock, Ha-Ha-Tonka.

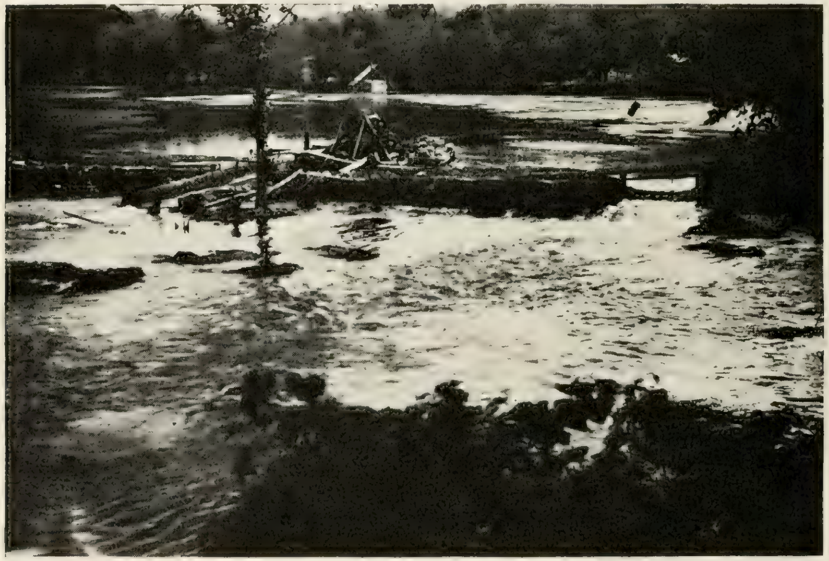
"A hundred yards or more to the east of the mansion is the stone stable, 45x110 feet, and of even finer workmanship than the house, the stone work having been done by Scotch workmen. Beyond the stable, on a higher point, is the water tower, 80 feet in height and with stone walls five feet thick at the bottom. Counting from the bottom of the bluff to the top of the tower, the height is about the same as that of Washington monument—555 feet. Two pumps, run by water power at the old corn mill, half a mile to the west, force the water into the tower tank, from which it is piped to other buildings, and to distant parts of the grounds, including an ice pond built on the hill, as the water in the lake never freezes. It has also been planned to have water furnish power for the electric light plant.

The Natural Bridge, Eighty Feet in Height, With Roadway Above.

"But in this enchanted spot it is not what man has done, but Nature's work that awakens our wonder and admiration. On one side of Sunset Hill, to which we have already referred, is the great spring which bursts from the foot of the mountain, making a surging stream of clear, cold water which whips itself into foam as it rushes against the rocks, makes the roar of the rapids, and far below the mansion forms "The Falls." To the north the rock walls rise abruptly and are bleak and bare, save for some scraggy cedars that overhang the perilous heights.

"From the south the big spring is reached by a path, very steep in places, which leads down through dense growths of trees, wild flowers and ferns. The spring has a flow eighty feet across and averaging five feet in depth—a volume of water sufficient to supply a large city. We follow this stream, in whose waters we see scores of fine fish, down through Trout Glen, the most beautiful of all the beauty spots, past the balanced rock, the meadows and the mill, until it spreads out, forming a 60-acre lake, on which wild ducks nest and moss and water-cress grow. At the lower end of the lake the water rushes over a dam, on through sluice gates, then a few hundred yards into the Niangua river, the water of which, like that of the lake and smaller streams, is so clear that the rocky bottom may be seen to a great depth.

"To the east of Sunset Hill are the coliseum and natural bridge. The coliseum, so called because of its formation, natural slopes making seats on all sides, would seat thousands of people, and the acoustic properties are so superior that all could hear a speech delivered in an ordinary tone of voice. From the central plane rise tall and almost branchless trees seeking the sunshine. The entrance to the coliseum is through the natural bridge, 80 feet in height, and above which runs a roadway. Farther to the east is the Devil's Fireplace, with an opening large enough for a yule log that would last a week, and a sure enough chimney so big that old Santa Claus could drive his deer down it. Nearby are the red sinks, really a small hill-enclosed meadow without an outlet, the water, after a rain, rapidly sinking into the ground.



The Outlet at the End of the Lake.

"But all the beauties of this wonderland are not above ground. The caves, of which there are a number, are among the finest in America. The principal ones are Island cave; Counterfeit cave, once the headquarters of a band of counterfeiters; Amphitheater cave; Bear cave, in which the last bear killed in the county met its death; Robbers' cave, long ago the rendezvous of a band of robbers; River cave; Cullins cave; Onyx cave; Bunch cave; Griffith cave, and Bridal cave.

Webster Bluff, a Fine Place for Fishing.

"In River cave, so called because of the stream that flows through it and which abounds in blind fish, one enters, not far from the mouth, an auditorium some fifty feet wide and almost as high. In the center of this stands a stalagmite, doubtless ages old, 24 feet in height and of most symmetrical proportions. It is the only one in this large chamber and its loneliness adds to its charm. The only disagreeable feature of a visit to River cave is having to wade for some distance through two feet of cold water a little way from the mouth of the cavern.

''Bridal cave, so named because it was there that a wedding once took place, is the most beautiful of all the caves. No one should fail to visit it, even though it means a five-mile walk over mountains and the ''worming'' of one's way through a very small opening when finally the cave is reached. About 100 yards from the entrance is the organ, a peculiar stone formation, which, when skillfully struck, gives forth the different tones, especially the deeper ones, of a pipe organ. Farther on one comes to the stone forest where giant stalactites and stalagmites meet and often interlock. There are jagged rocks to be climbed and dark, yawning chasms to be crossed, and care must be exercised as one climbs along the slippery paths. Sometimes the way leads through narrow passages, then into some great auditorium, the ceilings of which, shrouded in darkness, one cannot see. Here and there, supporting the great arched roof, are long stone columns as perfect and symmetrical as were ever carved by the hand of man. The lights carried lend added mystery and charm, driving ahead the dense darkness which divides, a part following close upon our heels. Many who have visited both this cave and the Mammoth cave in Kentucky pronounce this the more beautiful.

''The Ha-Ha-Tonka region is an ideal place for the hunter and the fisherman. The streams abound in trout, bass, crappie and many other game fish. The late Mr. Snyder was an enthusiastic fisherman and stocked the streams with a carload of rainbow trout. The finest trout shown at the St. Louis World's fair were taken from these waters. It has been several years since bear were seen, but there are yet a number of deer in this region. Wild turkey are so plentiful that no good hunter who knows the haunts—and the ''how''—need fail, in a day's hunt, to bag a bird. Wild cats are occasionally killed, and small game of all kinds is plentiful.''

SOME OBSERVATIONS ON MISSOURI AGRICULTURE AS SEEN FROM CENTRAL EUROPE.

(M. F. Miller, Professor of Agronomy, University of Missouri.)

Note—Professor Miller has been in Germany during the last year on a leave of absence, but will resume his work in the University in the fall of 1911. The following article, prepared especially for this report, was written at Göttingen, Germany, under date of March 6, 1911.

Prof. M. F. Miller.

It is always of value to be able to see one's work as others see it. The man who buries himself in any line of work for years without occasionally getting away from it far enough to be able to see it from a distance, as it were, is apt to become narrow and to have his ideas perverted. As I have been closely associated with Missouri agriculture for a number of years and am now spending some time among European agriculturists, this opportunity of seeing Missouri agriculture from a distance, of seeing it from the point of view of the European, I consider of immense value. This is especially true because of the fact that the agriculture of European countries is so much older than ours, the various operations so much better systematized, and, on the whole, the methods so much better. To be sure the conditions are radically different, but we have here the conditions which are later to exist in America, at least in large measure, and it should be of great value to us to study these conditions, in order to so shape our future operations as to incorporate what is desirable and to avoid what is undesirable in the agriculture of these older countries. Undoubtedly the future conditions in the United States will be largely the result of factors over which those interested in better agriculture have little control, but by a proper foresight and a proper instruction of future generations we shall be able to exert a great influence in bringing about those conditions which are most desirable.

In viewing our agriculture from a European viewpoint, therefore, the most important things to be mentioned so far as helping our farmers to better things is concerned, are not those in which we excel the European, by reason of our newer lands and smaller population, but those in which our agriculture is inferior. The American farmer needs no praise, no compliments; he has had enough of these. What he does need is, first, a profound realization of the fact that from a European viewpoint he is coming far short of his opportunities, and second, a knowledge of how he can improve his methods so as to make his operations not only more profitable, but so as to leave his land to his sons as productive or even more productive than he found it. The latter is a matter of detailed study by the farmer himself with the use of every available aid, but a few observations on the former from the vantagepoint of central Germany may be of interest to Missouri farmers.

One of the most important things that impresses one in European agriculture is the extreme care used in saving every available bit of material that will keep the soil fertile. Nothing is wasted. Every available thing goes back on the land. If the Missouri farmer could be brought to a realization of what is actually lost every year through the careless handling of manure, through the waste of the great quantities of material which would add organic matter to the soil, and through the washing of bare lands, and then if he could be induced to prevent these losses. the return would mean millions to the State. I do not mean that it is necessary to have the same point of view as the European peasant woman gathering manure from the roadway in a basket, but our farmers must learn to be saving of their soil resources if we are to continue prosperous. The material that is annually lost to the soil from the average Missouri farm. if put to proper use, would support another family, and within sixty years, at the present rate of increase in population of the United States, each farm shall have this extra family to support. This demand will, of course, be partially met by a curtailing of exports, as there is little hope of bringing about prevention of the present loss in anything like sixty years, but the sooner our farmers realize the necessity of preventing this waste the sooner will they adopt remedial measures. One cannot see the great care used in European countries in preventing waste without being profoundly impressed with the carelessness of the average middle west American farmer in this respect. In my opinon, too much importance cannot be attached to this matter.

A second impression that one receives in going about among the European farmers is the skill with which they handle their soils. The care they use in applying manure, the skill they display in calculating the commercial fertilizer applications, and the systematic methods they employ in green manuring are a revelation to the average American. One gets the impression that after all that has been said about the American farmer, he is still a novice in handling his soil. And one's mind reverts to the central west farmer, growing corn after corn until the soil will no longer produce a remunerative crop, then sowing to oats and grass in order to allow a sufficient rest to the land that it may produce more corn crops, yet with the tendency ever downhill. I, of course, realize that this practice is by no means universal, even on our better American soils, yet many farmers still follow it. I realize, too, that where such a practice is followed the farmer himself may not be to blame. His knowledge of better methods may not be sufficient to enable him to change, his finances may make a different system impossible with the knowledge he possesses, or, lastly, his soil may be still sufficiently rich to make this very profitable. But surely this exhaustive system is not a proper one if one can avoid it. It is too often the result of a desire to get all one can out of the land, regardless of the future. And it is largely because of such methods that the average yields of our crops are approximately half those of Germany, for instance. The other day a German who had heard that in America the wheat was headed and the straw left on the ground asked me how we managed to turn under so much straw. I told him that the men who did this in America were not bothered, as a rule, with too much straw. This shows the idea of the German whose conception of a wheat crop is a real one, and not a half crop, as is so common with us. I may say that the average wheat yield in Germany is 26 bushels per acre against 13 bushels in the United States. Incidentally, this incident shows the distorted ideas that most European people have of American agriculture. They seem to think of it as an agricultural paradise where every farmer is wealthy, where the farms are all domains, and where every other shower is a shower of dollars.

The matter of soil culture is also far better understood here than in America, and when one sees land turned sometimes three times between crops he wonders why. He also wonders how they find the time, especially when, as is so often the case, in Germany particularly, the exasperatingly slow-moving oxen are used for the purpose, and a plow which we should call antiquated. But the methods followed are those which long experience has shown best for this or that soil, and while I do not mean to say that our economic conditions would allow of anything like the same methods, yet the thought which comes is, what a little attention most American farmers give to the physical conditions of their soils and how important it is that one should study the principles of proper soil tillage so as to be able to apply these now and not wait for years of costly experience to teach what is best.

A third factor which plays a wonderfully important part in securing the large yields so common in the middle and north European countries is the systematic handling of crop rotations and cropping systems. The corn, corn, corn, oats, timothy hay plan of the old time North Missourian, to which I have already referred, would have no place here. To be sure this was at one time the most remunerative and may be yet on rich soils and under particular conditions. It can be made continuously remunerative and the land kept up at the same time by the use of a proper system of green manuring, feeding and fertilizing. It is not that the European farmer grows crops that are less exhaustive with the single exception of corn, which is little grown in Central and Northern Europe, but rather that he weaves these into a system which provides green manuring crops to maintain the organic matter in the soil, and that the straw and all other refuse materials are religiously conserved. His cropping system is one which conserves rather than exhausts the soil, one which maintains the organic matter rather than continually decreases it as is the case on the majority of Missouri farms today.

This matter of a failure to maintain the organic matter in the soil by American farmers is, therefore, greatly emphasized by a comparison of European with American systems. As a matter of fact, the most important factor concerned in the decreased yields of so many American farms is not a lack of plant food in the soil, but a decreased supply of organic matter. This prevents the making available of a sufficient quantity of plant food from the stores already there, through a decreased bacterial activity and a poorer physical condition. This is not saying that green manuring is the only requisite to permanent fertility, but that the maintenance of this supply of organic matter through proper cropping systems and a proper return of all available organic material to the soil is the first requisite. Commercial fertilizers may take its place for a time, but only for a comparatively short time. The only rational system is one which combines the use of fertilizers, where necessary, with the maintenance of the organic matter and the return of all available material to the soil.

A fourth great failure of the Missouri farmer, as seen from Europe, is that of giving too little attention to the use of good seeds. The production and distribution of good seeds is much better developed here than in America. To be sure, that does not apply to all American farmers by any means, for they are making great progress in that respect, and in this the Missouri Corn Growers' Association and the Missouri Co-operative Association in our own State are putting Missouri among the leaders in this respect, but when the average Missouri farmer is considered, his conception of the importance of good seeds is poorly developed. His plan is too often to take what is available, or if he buys, to allow the lower price of poor seeds to influence him in his choice.

I have had the pleasure of visiting a number of farms of Germany particularly, where the production of seed grains is one of the important features of the farm operations, and the knowledge which these practical men have of the principles of plant breeding and of the essentials to the production of standard high class types of seed grains is a revelation. The seeds are not only carefully selected and grown, but are just as carefully cleaned and graded and are then sold, as a rule, through a seed growers' organization, or through a system of government control which insures their purity and quality to the buyer. In this we have much to learn. What we need in Missouri is not only a better appreciation of the value of good seeds, but a thoroughly organized system of distribution which shall aid the man who has good seeds to sell as well as control the unscrupulous man; an organization that is free from private or commercial influences, and which shall be maintained for the benefit of the farmers as a class as well as for those growers and seed dealers who put seeds on the market. In this the Corn Growers' Association and the Co-operative Association have an opportunity for splendid accomplishments.

There are many other things that stand out as being needed in Missouri agriculture as viewed from this distance and in this environment, but I have not space nor time for them. There are, of course, many things in which our agriculture is superior, too, but I have purposely refrained from mentioning them. As a matter of fact, one must see other countries before he appreciates America anyway. The very narrow opportunities of the European agriculturist impresses one most forcibly. Here, where things have reached a condition of fixedness from which one cannot escape, there isn't anything to which the farmer can look forward. A living is all he can expect, and with the smaller farms, from five to ten acres, this is not easily secured. But this is why their methods must be superior. It is a matter of actual existence. Of course, with the large farmer, it is different, and the life of such a landlord is usually a very pleasant one. But in America we have still the opportunity to avoid these conditions which mean a few large landlords and many small peasant farmers. Our agriculture is sufficiently young that it can be guided into the proper channels, if we can foresee the future accurately and then work together. And in this not only the agricultural colleges and experiment stations are concerned, but the agricultural press, the various State and National agricultural organizations, and particularly the progressive farmers themselves.

LIVE STOCK MARKETS OF YEAR 1910.

(Compiled from Market Papers and Reports to Board of Agriculture.)

Missouri farmers realized high prices for live stock sold during the year 1910, a great shortage serving as a spur and stimulus to the market.

According to reports made to the Missouri State Board of Agriculture on April 1st, there were but 48 per cent of the usual number of cattle then on feed on Missouri farms, while the percentage of hogs then on feed, as compared with an average year, was 37.9 per cent. The number of brood sows was placed at 64.5 per cent.

"Beef steer values the first few months of the past year were held at a comparatively high level, but the following months witnessed the real general summit of the trade," says the Daily National Live Stock Reporter. "During the first nine months the best prices were realized, the average top for the time making $7.88, while the average bulk of sales scored $5.78 to $7.43. The year throughout made the best showing in prices ever recorded on this market. Notwithstanding the sharp break in price levels, the last forty to sixty days values during 1910 were considerably above 1909, which was the previous best year's average. The average top last year was $7.73, while the bulk was at $5.62 to $7.24. During the late winter and early spring months of 1910, the shortage in the beef steer crop was stimulus of the higher prices. Thus feeders looked upon the situation most favorably and were refilling their feed lots with thin stuff right along. With the summer months rolling around, the supply of beeves was materially increased; this notwithstanding the fact that it was mostly sixty cent corn that they were being fed. Even with the increased supply, the market still held its high tone through the reason that general demand of buyers was keeping pace with the supply. Not until about the middle of October was there any marked change in values. Feeders then commenced to liquidate their holding and with the heavy supplies the market fell from its lofty state. With a continuance of the declining markets feeders rushed their beeves to market in an alarming state until they had forced the lowest level of the entire year during the latter half of November and the fore part of December."

The highest priced load of cattle sold at the National Stock Yards, East St. Louis, during the year 1910 were Missouri steers. This load, shipped from Cooper county, consisted of 20 head of choicely fatted 1,574-pound steers, which sold June 8 at $8.60 per hundred weight.

The highest point by the stocker steer market at the National yards was during the week of April 30, when a sale was made at 6¼ cents.

The Daily Drovers Telegram of Kansas City, in its review of the cattle markets, says: "The shortage in supplies naturally kept prices soaring in the first eight months, when the toppy beeves ranged anywhere from 15 cents to $1.50, mostly 60 cents to $1.25, higher than in the corresponding months in 1909. In the last four months of the year price conditions were reversed. Increased feeding operations resulted in the free marketing of short-fed cattle and prices began to sag in September with material declines up to the final months, when there was a slight reaction from the low level. In 1909, the last four months saw prices of choice toppy beeves 25 cents to $3.00 above the past year, and at the highest level ever known. Many peculiar and interesting features developed from the violent fluctuations in fed steers in the last quarter, prominent among which was the pronounced discrimination against prime heavy steers averaging over 1,300 pounds. It will be remembered there was a constant clamor for light and handy weight steers, and these sold frequently 50 cents to $1.00 above the extreme heavy weights and the men who took the pains to finish the latter generally lost money."

Top prices for native steers on the Kansas City market during 1910 were: January, $7.40; February, $7.50; March, $8.35; April, $8.40; May, $8.30; June, $8.50; July, $8.25; August, $8.15; September, $8.10; October, $8.60; November, $7.35; December, $7.35.

The Reporter, in its review of the 1910 hog market, says: "The year started out with the top around $8.50, but soon reached $9.00, and by the first of March was up to $10.00. During March prices advanced rapidly and reached $11 before the end of the month. Early in April the high notch was reached, $11.15, thereby surpassing all previous records for this market. Values soon dropped off and went under $10 before the month of April was gone. The front figure remained nine from the latter part of April until nearly the middle of September, when for a short time $10.00 or a little more was paid. Nine was again the front figure until the first of November, when prices started down again and did not stop until $6.95 was the high point before the month was gone. The market reacted during December and reached $7.95."

The highest full carload of hogs sold at the National Stock Yards, East St. Louis, came from Moniteau county, Missouri. There were 64 head of these hogs, averaging 298 pounds, and they sold on March 29 at $11.10 per hundredweight. On the previous day, when the top price of the market for the year was recorded, 45 head of 264-pound hogs from Illinois sold at $11.15.

The 1910 Kansas City hog market is reviewed by the Drovers' Telegram, in part, as follows:

"The year, as a whole, was one of limited supplies and high prices. Still the spread between the high price and the low price of the year was unusually large and ranked among the biggest spreads in the history of the local yards. The difference between the highest top price, $10.95, paid in March, and the lowest top price, $7.05, paid in November, was only a dime less than $4.00. It was a year of nervousness. There were all kinds of predictions and nearly all kinds of predictions were realized."

Top prices for hogs at Kansas City, by months, were: January, $8.75; February, $9.60; March, $10.95; April, $10.80; May, $9.67½; June, $9.65; July, $9.35; August, $9.55; September, $9.85; October, $9.35; November, $8.60; December, $7.82½.

The year's sheep market was interesting. To quote the Drovers' Telegram, in its annual review of the year, "There was nothing small or limited about the sheep trade in 1910. Everything was done on a big scale and the year was a record breaker, from the standpoint of hugeness. The supply at both the local and other leading markets was the largest in the history of the sheep raising industry."

"The accompanying table," continues the Telegram, "shows the high prices paid for mutton and lambs in the different months of the year 1910. (This is exclusive of young spring lambs, for which the year's top was $15.)

Month.	Lambs.	Yearlings.	Wethers.	Ewes.
January	$8.65	$7.90	$6.25	$5.75
February	9.20	8.75	7.75	7.15
March	10.20	9.50	8.60	8.50
April	10.00	9.00	8.75	8.25
May	9.50	8.00	7.75	6.85
June	9.60	8.00	*6.50	*5.75
July	8.25	*6.50	*4.60	*4.50
August	7.00	*5.75	*4.60	*4.35
September	7.00	*5.40	*4.60	*4.65
October	6.90	5.25	4.50	4.25
November	6.75	5.75	4.50	4.20
December	6.50	5.60	4.35	4.00

*Shorn.

"At the close of the year conditions were far from satisfactory. There was a good demand for stock, but there were enormous supplies in the country with which to satisfy the demand. The plea of quality and finish, used so well in previous years, did not appear as a particularly strong card."

The Live Stock Reporter of January 2, 1911, said editorially: "The live stock trade for the year 1910 is now a matter of history. All the worrisome details, the hurry and bustle, the pleasant things and those not so agreeable, have gone down into the past. Reviewing the 1910 trade in a broad way, it may be classed as a lean year. High priced grain curtailed feeding operations in the corn belt territory, and this was reflected in the remarkable shortage in hogs and (until the closing months of the year) a paucity of fat cattle and sheep.

"Out of the northwest during the summer months came a great movement of range cattle and sheep, forced to market because of the great drouth. Had it not been for this fact the aggregate receipts of all markets for the year would show up even much lighter than they have done.

"It has been a year of high average prices for live stock. Hogs shot above the wonderful pinnacle of $11, the highest known since war days. Sheep and lambs and fat cattle sold at exceptionally strong values during the first half of the year until rangers came in and knocked the props from under the markets.

"Even after the summer declines set in, prices ruled relatively good on cattle and hogs. Quarantine cattle marketed during 1910 generally made good money for their owners. Horses and mules have sold at figures way above normal."

USING SPECIAL TRAINS IN AGRICULTURAL WORK.

(W. L. Nelson.)

More than 2,600 miles of railroad covered, lectures heard by 107,000 people, 17,000 bags of seed distributed—such, in brief, is the story of a quartette of trains that have, since January 1, carried the gospel of good seed and stock, also the seed and the stock, to Missouri farmers. Such is the Missouri-Macedonian method—the "show me" and help me plan, made possible by the co-operation of railroad officials, the Missouri Agricultural College and State Board of Agriculture. It is the belief of these three agencies that much good may be accomplished by telling the people how to grow better crops and to breed better stock; that more good will follow if in addition to getting these truths before the people they are also shown prize corn or cattle, the result of scientific methods; and that the most good will come when the people are told what to do, shown the outcome of similar effort, and have placed in their hands the material with which to work it. It is logical. It is likely.

On January 23 and 24 a special agricultural train was run over the Kansas City, Clinton and Springfield road; February 21 to 25, inclusive, one over the Frisco's Missouri tracks; March 7 to 11, another over that part of the Burlington in Northwest Missouri; March 21, 22 and 23, another traversing the Wabash system in the State.

CLINTON
STATE DAIRY
POULTRY GOOD
ROADS SPECIAL

A Motor Train—"State Dairy, Poultry and Good Roads Special."

It is doubtful if any other trains in any other state have ever approached these in combined interest, enthusiasm, attendance and good accomplished. These splendidly equipped trains, furnished free by the railroad companies, but at an operating cost totaling thousands of dollars, represent the development and growth of a Missouri idea.

A number of years ago when John T. Stinson, now Secretary of the Missouri State Fair, was connected with the Fruit Experiment Station at Mountain Grove, he conceived the idea of fitting up a box car as a laboratory whereby orchard owners might be given lessons in the mixture and use of sprays, and in which spraying apparatus might be transported. The Frisco railroad was quick to co-operate to the extent of putting the plan into practice—and crude as was the beginning, it marked the birth of the demonstration car idea in Missouri.

The agricultural trains, such as have recently been run, represent the gratifying growth of an idea of proven worth and one pregnant with promise. From time to time "good roads trains" and others have since been operated in Missouri. Last year the Missouri, Kansas and Texas Railway Company put on an agricultural train; the Frisco two trains, one a dairy and agricultural train, the other a "good roads demonstration train," carrying a complete complement of road working machinery. The Kansas City, Clinton and Springfield road ran a novel "dairy, good roads and poultry train," made up of motor cars. Other railroads making applications for assistance in the way of speakers and teachers for their trains had to be refused, as the Agricultural College and Board of Agriculture were unable to supply men at the time the officials wished to operate the trains.

Prof. E. A. Trowbridge Speaking to One of the Crowds at Marionville.

From the box-car beginning to the four big agricultural trains of the spring of 1911—trains made up of comfortable lecture cars for the hearers, sleeping and dining cars for the speakers, and specially equipped baggage cars for live stock—represents not alone a growth born of ambition, but rather a breadth of vision and a desire on the part of those whose work is inseparably connected with the soil to better serve the State. Once it was enough to merely establish an agricultural school; later it was thought worth while to conduct a campaign to encourage students to come; today, with colleges crowded, we are literally loading our learning behind locomotives and pulling it to the people.

On all the agricultural special trains were one or more representatives of the Missouri State Board of Agriculture and a number of the members of the faculty of the Agricultural College of the University of Missouri. Different professors, in so far as possible, were selected for the various trips, so that the regular work at the college would not be interfered with. Dr. A. Ross Hill, President of the University, showed his interest in agriculture by going on one of the trains, while F. B. Mumford, Dean of the College of Agriculture, was on two or more of the trips and ''made a regular hand'' at speaking.

At the instance of S. M. Jordan, ''the Missouri corn man'' and farmers' institute director, arrangements were made for distributing seed corn and cowpeas from the trains. This seed, which had been secured through some of the best growers in the State, was sold at ten cents per quart, sales being limited to one quart bag to a person. The object was to encourage the use of better seed, to enable many to get a start for another season, not to make money from the sales. All money received from seed sold was remitted to those who furnished it. The demand for seed far exceeded expectations, and one railroad official, who doubtless voiced the sentiment of others, gave it as his opinion that the seed distribution was the greatest feature of all, the one promising most for the future. The object in the distribution of cowpeas, one of the best fertilizing plants known, was to encourage more extensive growing and the

S. M. Jordan, the "Corn Man," Explains the Difference.

saving of seed, which has heretofore been very scarce and high in price, starting in early spring at $2 or $3 per bushel and rapidly advancing until the supply had been exhausted. For this reason a part of the price asked for cowpeas distributed from the agricultural trains was that the seed crop be saved. Cowpeas can be profitably produced at half the present selling price, and an acre of this crop will equal or exceed in value an average acre of corn in Missouri. The object in handling the seed corn was to give a great many people a start of as good seed as money will buy, for it is a fact that of the million bushels of corn planted in Missouri each spring a very large per cent is of more or less questionable quality. If by the use of better seed the Missouri corn yield can be increased only one bushel per acre, it will mean an increase of approximately 8,000,000 bushels, equaling in value in one year the cost of a new capitol.

Prof. R. H. Emberson Talking to School Boys and Girls at Norborne.

No live stock was taken on the Kansas City, Clinton and Springfield trip, the first one of the year. While this trip lasted but two days, 2,000 quarts of corn and 800 quarts of cowpeas were sold to those among the 5,000 farmers who were reached. More corn could have been disposed of had not all on the train been sold before noon of the second day. From this experience it was seen that on trains to follow it would be necessary either to limit number of sales at each stop or to do less advertising. On the Frisco trip, where some 45,000 people were reached, 9,600 quarts of seed were distributed along the 930 miles of track. This seed, if planted on 2,500 acres and given careful cultivation, should make at least five bushels more corn, worth, at 50 cents per bushel, $6,250 more money for the farmers, to say nothing of the good seed that will be saved for next year. In the southern section of the State, where this seed was distributed, a smaller amount of good seed has been grown than in the northern and central parts of Missouri. Yet the people are thoroughly alive to the importance of what they plant. As proof of this the interest at Neosho, where the last stop on the Frisco was made, may be cited. Here between 3,000 and 3,500 people waited and actually stood in the rain to hear the lectures, and so great was the demand for seed that it was impossible to take care of the orders. Additional orders were later cared for through the city's commercial club. One man who came to the car stated that he had traveled twelve miles especially to get the corn, and that he did not want to make another trip. He, with a few others, who had made almost as great sacrifices to secure the seed, was accommodated. Some corn was taken on the Burlington, but not advertised, as it was not thought necessary to do so, much good corn being grown in Northwest Missouri. However, 3,200 quarts of seed, about equally divided between corn and cowpeas, was disposed of on the trip. No corn was taken on the Wabash, but hundreds of inquiries revealed the fact that an immense quantity was wanted. In the three days 2,000 quarts of cowpeas were distributed.

Crowd Outside the Cars Waiting to See Missouri Chief Josephine.

The twelve ears of Reid's Yellow Dent corn, grown by T. R. Douglass of Columbia, and which won for Missouri the first prize on yellow corn at the National Corn Show at Columbus, Ohio, were carried on the train. This corn did more than attract attention; it told a striking story of the value of scientific corn breeding.

On the Frisco, Burlington and Wabash trains a car of live stock, including Missouri Chief Josephine, the world famous Holstein cow, and other animals owned by the Missouri Agricultural College, was carried. The Holland Stock Farm also furnished several head of horses for the Frisco train. While the object in taking all this stock on the trip was to afford thousands of Missourians an opportunity to study the animals and to better appreciate the value of such breeding, another purpose was also served. Many who might not have been interested in either the seed distribution or the lectures were reached through their desire to see the stock.

Missouri Chief Josephine.

It seems that everybody had heard of Josephine, the great cow with a milk record of 52 quarts (110.2 pounds) in one day, 49 quarts of milk per day for one month, 17,009 pounds of milk in six months, and a complete and continuous world's record for eleven months—a cow that has given her weight in milk in fourteen days. Following the lectures, during which time nobody was admitted to the exhibition car, the crowds, with school children and ladies in the lead, formed in line and passed through the train at lively clip, professors or student attendants in charge, telling briefly and over and over again the story of the stock. Looking at the people as they crowded the cars one man said, "Well, agriculture has politics skinned a mile. 'Teddy,' Bill Bryan and Bill Taft couldn't have the big crowds that cow is getting, and she doesn't blow about it either." "Yes," replied the member of agricultural party to whom the remark was made, "the two Bills and 'Teddy' have lots of people pulling for them, but this cow has no 'pulls' except by the boys in the dairy department; they give her four pulls a day in four places each time, and the result is enough milk to supply a dozen families." Many people, not alone children, but grown-ups, too, made sure to reach out and touch Josephine as they passed her box stall decorated with ribbons and flags, gifts of children along the line. At St. Joseph some little folks wanted a taste of Josephine's milk, and they got it. It was at another station where a little ragged negro boy, looking longingly toward the train, was heard to say, half to himself, "Gosh, I do want to see that cow." He was helped to climb into the car. At Quitman a blind man was taken through the car to "see" Josephine, and it was with keenest delight that he ran his hands over her. The next day as the train was standing on the siding at Weston, with the audience in the lecture cars, a man, partially paralyzed in lower limbs, made his way to the depot by pushing a sort of frame in front of him. He looked at the train, but seemed to think it too far for him to try to go along the track. The railroad "boys" in charge of the train saw, and their hearts were touched. Soon they signaled on to the main tracks, and on the block which would have halted any train passing either way, took the poor fellow through the cars, and at least once in his life he was unable to express his feelings. He was helped down and the train pulled out.

At Many Places the Lecture Cars Failed to Afford Sufficient Room for the Crowds.

When one of the trains, all of which had been extensively advertised, reached a station where a stop (from forty minutes to an hour was spent at a place) was to be made, no time was lost. Everything moved like clockwork. The man whose duty it was to announce the lectures got busy. The two lecture cars, with two lecturers in each dividing the time, were hurriedly filled and the speakers launched into their subjects without waiting for the formality of an introduction. In the depot waiting room, on the platform or out in the open, some teacher from the University took charge of the school children. Sometimes, too, another speaker talked poultry, so that there were from five to six speeches at each stop. At Albany, old home of S. M. Jordan, institute director for the Board of Agriculture, the crowd was so large that after the lecture cars had been filled there were more people on the outside than there were in the coaches. Somebody, disappointed at being unable to hear his old friend, called out, "Come out, Sam, where all of us can hear you." Director Jordan gladly heeded the suggestion and was heard by as many people as his voice would reach. At several other places "overflow" meetings had to be held. The daily programs, as carried out, made strenuous work for the speakers, there being an average of about a dozen stops per day.

Dr. J. C. Whitten Addressing an Overflow Crowd at Mansfield.

Not until the locomotive whistle signaled the end of the lecture period was anybody allowed to see the stock or to purchase seed. The idea of those in charge of the work was that the visitors should take home with them something in their heads as well as in their hands. Instruction, then seed, was the order of business.

The enthusiasm of these meetings and the reception accorded the speakers—the very "atmosphere," so to speak—was such as cannot be caught by camera or portrayed by pen. "Why, it was simply amazing, I was astonished and delighted," said a member of the Agricultural College faculty. In many towns bands were playing and flags waving as the train neared the depot. Sometimes there were college and high school yells, and almost without exception pupils and teachers of the public schools were present. The Rockport high school, 175 strong, and with colors flying, made the trip to Langdon on the Burlington by special train. They decorated Josephine and crowned her "Queen of Missouri." A citizen of Aurora, in the southern part of the State, was so impressed with Josephine's record that he has written a poem and dedicated it to her.

A Part of the Crowd Welcoming the Agricultural Special at Mexico.

Evening meetings were held in court houses or halls, but even this arrangement did not always insure sufficient room for the crowds of people who came, prompted by more than curiosity. They seemed as eager to hear as to see.

With a view to benefiting the largest possible number of people and to make lasting the lessons, special printed matter had been prepared for the press and given to the local newspaper editors at places where stops were made. Brief summaries of speeches had also been printed in pamphlet form. This literature, distributed entirely at railroad expense, supplied valuable information on care of live stock, and on corn, alfalfa, cowpeas and other crops.

"In point of value from the lectures," said Director Jordan, on the day following the close of the last trip, "the K. C., C. & S. and the Burlington perhaps lead. In the distribution of seed the K. C., C. & S. and the Frisco excel; while in point of enthusiasm and attendance the Frisco and Wabash are first. On these two trips the crowds were simply too large to handle. Neither words nor photographs can half do justice to the Missouri Agricultural spirit that is rampant in the State today. Following almost every stop was a request that we return soon with an institute for one or two days. We now have requests for lectures in all of the months of the year, excepting May and June.''

Speaking of the good accomplished through the agricultural trains, Dean F. B. Mumford of the College of Agriculture said: ''Five men from the College, in thirteen days time, gave instruction to 93,800 people from the special trains on the Frisco, Burlington and Wabash Railroads. On these trips 98 stops were made and 512 lectures on agricultural subjects were made by men from the College of Agriculture. This simple statement of facts carries no adequate idea of the far-reaching influence of this project on the agricultural practices of Missouri. In the year 1910 a special train on the Frisco Railroad was followed by the awarding of 45 Frisco scholarships in the counties through which that road runs, and resulted in increasing the attendance in the two-year winter course from 38 in 1909-10 to 139 in 1910-11. The correspondence of men in the College of Agriculture was more than doubled. The number of bulletins published and distributed was more than quadrupled. These are tangible facts and can be justly regarded as directly traceable to the special train trips. It is the function of the men in the College of Agriculture not only to give efficient instruction to students, but to convince the farmers that special training in agriculture will be as efficient in bringing success to the coming generations of farmers as such training has been for lawyers, physicians and engineers. That the College of Agriculture is succeeding received ocular demonstration in the multitudes of people who thronged the stations, platforms and audience cars on the special train trips. The success of the special trains on the Frisco, Burlington and Wabash in 1911 has established a new record. So far as I have been able to discover there is no record of any special train in the United States that has succeeded in drawing so many people. This is a matter of great gratification to those in charge of this enterprise.''

It may well be said that the railroad officials who made possible the ''college on wheels'' have rendered a distinct and lasting service to the State.

MISSOURI FARM FACTS AND RURAL PROBLEMS.

(By W. L. Nelson, Assistant Secretary Board of Agriculture.)

INTRODUCTORY.

W. L. NELSON.

A number of months ago the author mailed a list of some seventy questions, dealing with country life conditions, to the six hundred correspondents of the Missouri State Board of Agriculture. The replies cover the 114 counties of the State and give a valuable insight into farming from the farmer's viewpoint.

It is very gratifying to note that the answers received are not those of ranting demagogues or chronic fault-finders, but of thoughtful, intelligent men, who see many remedies within their own reach, men who have more to say of the need of crop rotation, soil conservation, better seed and well-bred stock, than of trusts, combines and monopolies. True, the need of country co-operation is frequently mentioned, just as is the importance of a from-country-to-customer trade with its promise of doing away with so many middlemen, who are said to be responsible for more than fifty per cent. of the cost of farm products to the consumer. Considering the general character of the replies, it may be said that ranting has given place to reason; the talker, to the thinker; the doubter, to the doer.

GREATEST FARM NEED OR PROBLEM.

One question submitted was, "What, in your opinion, is the greatest need of the farmer of today, or the greatest problem with which he must contend?"

Of 440 correspondents who replied to this question, 286 seem to have considered the need, while 154 evidently had in mind the problem. It is, of course, impossible to divide the replies with exactness.

Of the replies received, 111, practically one-fourth of the entire number, or almost 40 per cent. of those who answered the question from the problem viewpoint, answered, "Hired help." Sixty-two correspondents, or 14 per cent. of the entire number, believe that the maintenance and improvement of soil fertility is the greatest problem with which the farmer must contend. Good roads, according to 47 correspondents, or more than 16 per cent. of those who answered the question from the needs viewpoint, are most important. Seventeen replies are to the effect that the farmer's greatest problem is how to combat combinations that are believed to fix prices for what he sells or buys. Thirteen correspondents see a tendency toward too much style and extravagance in the farm home. The middleman, "who produces nothing but sells much," must be eliminated or at least have his powers greatly curtailed, ten farmer correspondents believe. Nine name co-operation in buying and selling and for mutual aid and protection in other ways as the greatest need. Other replies of which there were more than one are as follows:

Weather conditions, 7; how to keep the young people, and especially the young men, on the farm, 7; better transportation and lower freight rates, 11; the tariff, 7; the liquor question, 2; Hessian fly and other insect pests, 7; soil washing, 2; overflows, 2; weeds and grass, 3; better methods in selling farm products and buying supplies, 2; high wages, 4; marketing produce, 3; indebtedness, 2; work, 2; indolence, 2; money power, 2; high prices for food and clothing, 3; to increase production per acre, 4; to study farming, 3; better education and more agricultural science, 5; better methods of farming, 2; tenants, 2; less acres and more intelligent cultivation, 3; better schools, 2.

The following replies were also received, there being but one of each:

Social betterment, fence posts, knowledge and advantages of modern conveniences, diversification, to make farm pay interest on its value, to make enough above the cost of existence to pay the interest on watered stocks in combines, to get nearer the final market price of products, reduce need of help by scientific farming, means of holding products until there is an active market, to produce more and better crops, seed farms to grass and clover, willingness to pay more for help, R. F. D. mail service, parcels post, way to keep fresh meat in summer time, tiling, timber, protection of timber, uniform price of farm produce above cost of production, to keep up with the times, dwelling houses with modern conveniences, good barns, sufficient capital, better machinery, smaller farms, more cowpeas and clover, protection from local monopolies, stock law, learn what is best adapted to both soil and market, fair interest on investment over and above living, system, labor-saving machinery, more silos and manure spreaders, stricter laws against speeding autos, selection of best stock and crops for profit, knowing where and how to market products, graft, speculators, boards of trade, ignorance, organization and co-operation of commercial interests, cost of production, money, raising scrub stock on high priced land, merchants, dishonest merchants, fly-by-night drummers, agents and salesmen; increase in cost of farming implements, high rates of interest, shipping products and stock at a profit, seed corn fakers, wet land and lack of drainage, too many mortgages, expense between producer and consumer, housework, careless farming, making a living for wife and kids, unsteady prices for grain and live stock, others fixing both the buying and the selling price, changing seasons, poor crops, borers in apple trees, tariff, bought legislators, representatives in legislature, class legislation, need government ownership of public utilities; people, not trusts, should control; protection instead of unreasonable, hurtful and sumptuary legislation; having to contend with private ownership of public utilities; politicians and professional office seekers; high cost of official administrations; how to obtain fair, honest and intelligent legislation; the enormous running expenses of the government.

It might possibly be said of some of the replies received that they are more interesting than valuable, yet they are valuable because of the fact that they are from farmers, not theorists.

REPLIES FROM FARM WOMEN.

''What one change or improvement about the farm house would, in your opinion, be of the greatest benefit to the housewife? In other words, what one would you rather have?'' Of 361 Missouri farm women who replied to this question 193, or more than 53 per cent, answered, in substance, ''Some system of running water in the house.'' Forty replies, or more than 11 per cent, expressed a wish for gas or other modern lighting system. The need of a furnace or other modern heating system is mentioned by 27, or 8 per cent of those who replied. The following were among other replies received:

Good help, 6; more conveniences, 6; concrete porches and floors, 6; more convenient dwelling, 5; modern kitchen, 5; basement or cellar, 5; power to run washing machine and churn, 3; sewers, 3; more good house room, 2; more convenient outhouses, 2; to get rid of flies, 2; best washing machine made, 2; ice house, 2; laundry, 2.

Replies of which there was but one each were: summer laundry, summer kitchen, model kitchen, washroom, dairy room, cold storage room, patent churn, pantry, concrete cellar, windmill, screens, dining room, cream separator, summer house, automatic range or cook stove, a cool way to cook, wash and iron; a way to cook without fire, modern plumbing, less help and more conveniences, gasoline power, oil stove, a practical fireless cooker, way to keep milk, means to keep poultry better, labor-saving devices in kitchen, cooler kitchen, good cistern, refrigerator, linoleum for floors, good dairy barn, rat-proof yard, better buildings, better sanitary conditions, good cooking lessons, storage battery, better drainage about buildings, less rooms and more closets, better improvements, less work in hot weather, stricter housekeeping, greater love of home, world-wide prohibition, less work, more privileges, to be well provided for, a good saving cook, a husband who is at all times agreeable, a law to prevent the employment of girls in work outside of the home, husband to take more interest in pretty yard and shrubbery, fencing, etc.; means to content woman to her sphere; none needed.

MODERN CONVENIENCES AND IMPROVEMENTS.

Many writers have recently had much to say of the many modern homes in the country. That there are now many more than were to be found a few years ago is evident to all who have taken pains to investigate, yet the number is still very small. According to careful estimates made by Missouri State Board of Agriculture correspondents, representing each of the 114 counties in the state, less than two—1.84—per cent. of the rural homes in Missouri are provided with any modern water system. By sections the percentages are: Northeast, 0.93; northwest, 2.3; central, 2.81; southwest, 2.71; southeast, 0.44. Correspondents give 2.56 per cent, as representing the number of farm homes having furnace or other modern heating system. By crop division sections the reports show: Northeast, 2.9 per cent.; northwest, 4.6; central, 2.8; southwest, 1.56; southeast, 0.1. Gas or other modern lighting, it is estimated, is to be found in 3.23 per cent. of the farm homes of the state—by sections: Northeast, 2.64 per cent.; northwest, 4.15; central, 4.58; southwest, 0.93; southeast, 3.87.

With 276,081 farm homes in Missouri, as shown by the 1910 census, we find that an estimate based on correspondents' reports shows more than 5,000 farm homes having some system of running water, about 7,000 farm homes with furnaces or other modern heating system, and approximately 10,000 country residences equipped with acetylene gas or other improved system of lighting.

Despite all the talk of the large number of automobiles owned by Missouri farmers, correspondents report only 1.3 per cent. of the farmers owning autos. It is a pleasure to note, though, that 7.3 per cent. of the farmers in Missouri own manure spreaders. Eighty-nine per cent. of the correspondents report more manure spreaders than automobiles bought during the last ten years.

THE LABOR PROBLEM.

As has been shown by reports received from correspondents, the labor problem is regarded as one of the most serious with which the farmer must contend. It is the belief of 88 per cent. of those who answered the question, "Is it now harder to get help on the farm than it was ten years ago?" that it is more difficult; while 95 per cent. think it harder to get help in the house. During this decade, marked by a growing scarcity of help, it is estimated that wages for farm hands advanced 41 per cent, and for help in the house 46 per cent. The average monthly wages paid help in the house, taking the state as a whole, is said to be less than $10—$9.78, to be exact. By sections, we have: Northeast, $10.62; northwest, $12.08; central, $9.17; southwest, $8.63; southeast, $8.41. The average monthly wages paid farm hands who also have bed and board provided is given as $21.12, the figures by sections being, northeast, $22.56; northwest, $24.83; central, $20.13; southwest, $19.30; southeast, $18.80. Where house is provided for man and family but he boards himself the average wages for the state are given as $27.85. The sections show: northeast, $29; northwest, $30.66; central, $25.82; southwest, $26.60; southeast, $27.18. Daily wages, except at harvest time, show an average of $1.12 for the state—northeast, $1.19; northwest, $1.25; central, $1.07; southwest, $1.04, southeast, $1.06. Harvest wages for the year 1910 show $1.67 average for the State.

COST OF FARM EQUIPMENT.

According to reports received from between 500 and 600 Missouri farmers, the cost of equipping a farm (meaning by equipment, teams, farm machinery, etc.) has increased 62.5 per cent during the last ten years, the increase by sections being as follows: Northeast, 53; northwest, 56; central, 69; southwest, 61; southeast, 73.

CENSUS BUREAU FARM DATA.

On January 26, 1911, Census Director Durand issued the first official statement from the Census Bureau relative to the agricultural statistics of the State of Missouri, collected at the thirteenth decennial census. It is based on a preliminary comparative summary submitted to the director by Dr. LeGrand Powers, chief statistician of the division of agriculture in the Bureau of the Census. This summary shows for both the census of 1910 and that of 1900 the reported total value of farm land, buildings, implements, and machinery; total acreage; improved acreage; average acres per farm; average value per acre of farm land and buildings; average value per acre of farm land alone; and the aggregate expenditures for labor and fertilizers. It also distributes the total number of farms according to color of farmer; specified character of tenure; whether held free or mortgaged by owners; and by certain acreage groups.

The director gives notice that the summary's figures are subject to revision later, owing to the fact that a number of farms whose returns are incomplete will be issued in the final tables.

The census of agriculture was taken primarily for the purpose of obtaining an accurate inventory of all classes of farm property existing on April 15th, 1910; a complete exhibit of farm operations during the year ended December 31, 1909; and a statement of the number and value of domestic animals in cities and villages on April 15, 1910.

THE PER CENTS OF INCREASE AND DECREASE.

It is pointed out in the preliminary statement that the principal rates of increase in Missouri in 1910, as against 1900, are: In the total value of all farm land alone, 107 per cent.; in the average value per acre of farm land alone, 104 per cent.; in the total value of farm land and buildings, 103 per cent.; in the average value per acre of farm land and buildings, 100 per cent.; in the total expenditures for labor, 89 per cent.; in the total value of farm buildings alone, 81 per cent.: in the total expenditures for fertilizers, 78 per cent.; in the total value of farm implements and machinery, 78 per cent.; in the total improved farm acreage, 7 per cent.; in the average acres per farm, 5 per cent.; and in the total farm acreage, 2 per cent.

The principal decrease during the decade occurred in the whole number of farms, amounting to 3 per cent.

The statement shows in detail that the number of farms reported in 1910 was 276,081, as compared with 284,886 in 1900, a decrease of 8,805, or 3 per cent.

The total value of farm land and buildings was given in 1910 as $1,710,505,000, as against $843,979,000 in 1900, an increase of $866,526,000, or 103 per cent.

The total value of farm land alone was reported in 1910 as $1,441,529,000, as compared with $695,471,000 in 1900, a gain of $746,058,000, or 107 per cent.

The total value of farm buildings alone was given in 1910 as $268,-

976,000, as against $148,508,000 in 1900, an increase of $120,468,000, or 81 per cent.

In 1910 the value of the farm land alone constituted 84 per cent of the total value of land and buildings, as compared with 82 per cent. in 1900.

The reported value of farm implements and machinery was $50,769,000 in 1910, as against $28,603,000 in 1900, a gain of $22,166,000, or 78 per cent.

The total acreage reported in 1910 was 34,516,000 acres, as compared with 33,998,000 in 1900, an increase of 518,000 acres, or 2 per cent.

The improved acreage was returned in 1910 as amounting to 24,528,000 acres, as against 22,900,000 in 1900, an increase of 1,628,000 acres, or 7 per cent.

The improved acreage formed 71 per cent. of the total acreage in 1910, as compared with 67 per cent. in 1900.

The average acres per farm reported in 1910 was 125, as against 119 in 1900, a gain of 6 acres, or 5 per cent.

AVERAGE VALUE PER ACRE.

The average value per acre of farm land and buildings in 1910 is stated as $49.56, as against $24.82 in 1900, a rise of $24.74, or 100 per cent.

The average value per acre of farm land alone in 1910 was reported as $41.76, while in 1900 it was $20.46, the amount of gain being $21.30, or 104 per cent.

Of the whole number, 276, 081, of farms reported in 1910 there were 272,435, or 99 per cent., operated by white farmers and 3,646, or 1 per cent., by colored farmers, as compared with a total of 284,886 in 1900, of which 279,933, or 98 per cent., were conducted by white farmers and 4,953, or 2 per cent., by colored. The decrease in the number of white farmers during the decade amounted to 7,498, and in the number of farms of colored farmers to 1,307.

The total number of farms operated in 1910 by owners, part owners, and owners and tenants, comprising the ''all owners'' class, was 191,563, as compared with 196,158 in 1900, a decrease of 4,595.

The total number of farms conducted in 1910 by cash tenants, share tenants, and cash and share tenants, comprising the ''all tenants'' class, was 82,533, as against 86,897 in 1900, a decrease of 4,364.

The total number of farms operated by managers in 1910 was 1,985, as compared with 1,831 in 1900, a decrease of 154.

The total number of farms operated by the "all owners" class constituted 69 per cent. of the whole number of farms in both 1910 and 1900; those operated by the "all tenants" class, 30 per cent. in both 1910 and 1900; and those conducted by managers, 1 per cent. in both decades.

Of the total number, 191,563, of farms operated in 1910 by the "all owners" class, there were 103,352, or 54 per cent., owned free of incumbrance, and 88,211, or 46 per cent., mortgaged.

The Census Bureau has no information respecting the number of mortgaged farms leased to tenants, nor figures for 1900 available for comparison with the 1910 data as to incumbrance.

DISTRIBUTION ACCORDING TO ACREAGE GROUPS.

The statement relative to farms distributed according to certain acreage groups shows that those of 19 acres and under numbered 19,283 in 1910 and 19,088 in 1900, a gain of 195; of 20 to 49 acres, 47,134 in 1910 and 56,931 in 1900, a decrease of 9,797; of 50 to 99 acres, 74,001 in 1910 and 78,933 in 1900, a decrease of 4,932; of 100 to 174 acres, 79,871 in 1910 and 78,941 in 1900, an increase of 930; of 175 to 499 acres, 51,829 in 1910 and 47,131 in 1900, an increase of 4,698; of 500 to 999 acres, 3,421 in 1910 and 3,268 in 1900, an increase of 153; and of 1,000 acres and over, 542 in 1910 and 594 in 1900, a decrease of 52.

ACREAGE GROUP PROPORTIONS.

Of the whole number of farms, those of 19 acres and under formed 7 per cent. in both 1910 and 1900; those of 20-49 acres, 17 per cent. in 1910 and 20 per cent. in 1900; those of 50-99 acres, 26 per cent. in 1910 and 27 per cent. in 1900; those of 100-174 acres, 29 per cent. in 1910 and 28 per cent in 1900; those of 175-499 acres, 19 per cent. in 1910 and 16 per cent. in 1900; those of 500-999 acres, 1 per cent. in both 1910 and 1900; and those of 1,000 acres and over, 0.2 per cent. in both decades.

The expenditures for labor in 1910 reached the sum of $18,526,000, as compared with $9,804,000 in 1900, an increase of $8,722,000, or 89 per cent.

The expenditure for fertilizers amounted in 1910 to $662,000, while in 1900 it was $371,000, a gain of $291,000, or 78 per cent.

SUMMARY FOR THE STATE.

The preliminary comparative summary follows:

ALL FARMS BY ACREAGE, VALUE OF LAND, BUILDINGS, IMPLEMENTS, ETC.

	1910.	1900.	Per cent of increase 1900-1910.
All farms	276,081.00	284,886.00	3 Decrease.
Total acreage	34,516,000.00	33,998,000.00	2 Increase.
Improved acreage	24,528,000.00	22,900,000.00	7 "
Average acres per farm	125.00	119.00	5 "
Value of land and buildings	$1,710,505,000.00	$843,979,000.00	103 "
Value of land	$1,441,529,000.00	$695,471,000.00	107 "
Value of buildings	$268,976,000.00	$148,508,000.00	81 "
Value of implements and machinery	$50,769,000.00	$28,603,000.00	78 "
Average value per acre of land and buildings	$49.56	$24.82	100 "
Average value per acre of land alone	$41.76	$20.46	104 "
Expenditures for:			
Labor	$18,526,000.00	$9,804,000.00	89 "
Fertilizers	$662,000.00	$371,000.00	78 "

ALL FARMS BY COLOR OF FARMER, TENURE, ACREAGE, GROUP, ETC.

	1910.	1900.	Amount of increase 1900-1910.
All farms by color of farmer	276,081.00	284,886.00	8,805 Decrease.
White farmers	272,435.00	279,933.00	7,498 "
Colored farmers	3,646.00	4,953.00	1,307 "
All farms by tenure	276,081.00	284,886.00	8,805 "
All owners	191,563.00	196,158.00	4,595 "
Owners free	103,352.00		
Owners mortgaged	88,211.00		
All tenants	82,533.00	86,897.00	4,364 "
Managers	1,985.00	1,831.00	154 Increase.
Distribution by acreage groups	276,081.00	284,886.00	8,805 Decrease.
19 acres and under	19,283.00	19,088.00	195 Increase.
20 to 49 acres	47,134.00	56,931.00	9,797 Decrease.
50 to 99 acres	74,001.00	78,933.00	4,932 "
100 to 174 acres	79,871.00	78,941.00	930 Increase.
175 to 499 acres	51,829.00	47,131.00	4,698 "
500 to 999 acres	3,421.00	3,268.00	153 "
1000 acres and over	542.00	594.00	52 Decrease.

LACK OF INCREASE IN RURAL POPULATION.

According to the official count of the returns of the thirteenth census, the population of the State of Missouri is 3,293,335, as compared with 3,106,665 in 1900, and 2,679,184 in 1890. The increase from 1900 to 1910, therefore, is 186,670, or six per cent., as compared with an increase for the preceding decade of 427,481, or sixteen per cent. More than seventy counties in the State, a large majority of those not influenced by some large town or city, show a loss of population. The census figures, by counties, follow:

	Population 1910.	Population 1900.	Population 1890.
The State	3,293,335	3,106,665	2,679,184
Adair	22,700	21,728	17,417
Andrew	15,282	17,332	16,000
Atchison	13,604	16,50[illegible]	15,533
Audrain	21,687	21[illegible]	22,074
Barry	23,869	25,[illegible]	22,943
Barton	16,747	18,[illegible]	18,504
Bates	25,869	30,14[illegible]	32,223
Benton	14,881	16,556	14,973
Bollinger	14,576	14,650	13,121
Boone	30,533	28,642	26,043
Buchanan	93,020	121,838	70,100
Butler	20,624	16,769	10,164
Caldwell	14,605	16,656	15,152
Callaway	24,400	25,984	25,131
Camden	11,582	13,113	10,040
Cape Girardeau	27,621	24,315	22,060
Carroll	23,098	26,455	25,742
Carter	5,504	6,706	4,659
Cass	22,973	23,636	23,301
Cedar	16,080	16,923	15,620
Chariton	23,503	26,826	26,254
Christian	15,832	16,939	14,017
Clark	12,811	15,383	15,126
Clay	20,302	18,903	19,856
Clinton	15,297	17,363	17,138
Cole	21,957	20,578	17,281
Cooper	20,311	22,532	22,707
Crawford	13,576	12,959	11,961
Dade	15,613	18,125	17,526
Dallas	13,181	13,903	12,647
Daviess	17,605	21,325	20,456
DeKalb	12,531	14,418	14,539
Dent	13,245	12,986	12,149
Douglas	16,664	16,802	14,111
Dunklin	30,328	21,706	15,085
Franklin	29,830	30,581	28,056
Gasconade	12,847	12,298	11,706
Gentry	16,820	20,554	19,018
Greene	63,831	52,713	48,616
Grundy	16,744	17,832	17,876
Harrison	20,466	24,398	21,033
Henry	27,242	28,054	28,235
Hickory	8,741	9,985	9,453
Holt	14,539	17,083	15,469
Howard	15,653	18,337	17,371
Howell	21,065	21,834	18,618
Iron	8,563	8,716	9,119
Jackson	283,522	195,193	160,510
Jasper	89,673	84,018	50,500
Jefferson	27,878	25,712	22,484
Johnson	26,297	27,843	28,132
Knox	12,403	13,479	13,501
Laclede	17,363	16,523	14,701
Lafayette	30,154	31,679	30,184

CENSUS BY COUNTIES—Continued.

	Population 1910.	Population 1900.	Population 1890.
Lawrence	26,583	31,662	26,228
Lewis	15,514	16,724	15,935
Lincoln	17,033	18,352	18,346
Linn	25,253	25,503	24,121
Livingston	19,453	22,302	20,668
McDonald	13,539	13,574	11,283
Macon	30,868	33,018	30,575
Madison	11,273	9,975	9,268
Maries	10,088	9,616	8,600
Marion	30,572	26,331	26,233
Mercer	12,335	14,706	14,581
Miller	16,717	15,187	14,162
Mississippi	14,557	11,837	10,134
Moniteau	14,575	15,931	15,630
Monroe	18,304	19,716	20,790
Montgomery	15,604	16,571	16,850
Morgan	12,863	12,175	12,311
New Madrid	19,488	11,280	9,317
Newton	27,136	27,001	22,108
Nodaway	28,833	32,938	30,914
Oregon	14,681	13,906	10,467
Osage	14,283	14,096	13,080
Ozark	11,926	12,145	9,795
Pemiscot	19,559	12,115	5,975
Perry	14,898	15,134	13,237
Pettis	33,913	32,438	31,151
Phelps	15,796	14,194	12,636
Pike	22,556	25,744	26,321
Platte	14,429	16,193	16,248
Polk	21,561	23,255	20,339
Pulaski	11,438	10,394	9,387
Putnam	14,308	16,688	15,365
Ralls	12,913	12,287	12,294
Randolph	26,182	24,442	24,893
Ray	21,451	24,805	24,215
Reynolds	9,592	8,161	6,803
Ripley	13,099	13,186	8,512
St. Charles	24,695	24,474	22,977
St. Clair	16,412	17,907	16,747
St. Francois	35,738	24,051	17,347
St. Louis	82,417	50,040	36,307
St. Louis city	687,029	575,238	451,770
Ste. Genevieve	10,607	10,359	9,883
Saline	29,448	33,703	33,762
Schuyler	9,062	10,840	11,249
Scotland	11,869	13,232	12,674
Scott	22,372	13,092	11,228
Shannon	11,443	11,247	8,898
Shelby	14,864	16,167	15,642
Stoddard	27,807	24,669	17,327
Stone	11,559	9,892	7,090
Sullivan	18,598	20,282	19,000
Taney	9,134	10,127	7,973
Texas	21,458	22,192	19,406
Vernon	28,827	31,619	31,505
Warren	9,123	9,919	9,913
Washington	13,378	14,263	13,153
Wayne	15,181	15,309	11,927
Webster	17,377	16,640	15,177
Worth	8,007	9,832	8,738
Wright	18,315	17,519	14,484

COMMENTS FROM CORRESPONDENTS.

FARM LABOR.

Wages for farm work are very high here, on account of other work being plentiful. There are a good many factories in this county employing men.—Butler county.

Public works and the cities put out such inducements for men and women that it is a hard matter to secure help on the farm or in the house. In other words, one man on the farm is trying to feed from 8 to 10 in town. The consequence is idle ground and all living so high that it is hard to get. True, farm products are some higher, but not in proportion to labor and what we have to pay.—Washington county.

Farm labor is hard to get and harder to keep, because they get so much money they want lots of time to spend it.—Barton county.

Farm hands get about $25 per month, but there are so many saw mills, stave mills and other lumber mills here, men will hardly work on the farm at any price.—Wayne county.

There are several public works near, in radius of ten miles, which is cause of scarcity of help. We are also near St. Louis, which takes all the girls that are any good for work.—Jefferson county.

Help on the farm is almost impossible to get. Farmers go together and do their own work.—Shelby county.

We need good help in the house more than anything else.—Monroe county.

Help in the house is unobtainable.—Audrain county.

Work in the house is greatest problem. Farmers wives have to overwork.—Marion county.

Our greatest need is divided between hired help, parcels post and better roads.—Scotland county.

It is almost impossible to get help on the farm at any price.—Audrain county.

Farm Labor. The world must be fed by the tiller of the soil.—Linn county.

Help on the farm and in the house seems to be the greatest drawback we have to meet.—Ralls county.

The greatest difficulty with which the farmer must contend is scarcity of good help in the field and in the house.—Audrain county.

It is impossible to secure competent farm labor sufficient to do the work.—Saline county.

The question of help.—Randolph county.

It is very hard to get farm hands, even at the increased wages.—Phelps county.

Competent labor. A large per cent. of our farmers kept one or more hired hands a few years ago, but now a hired man is almost a curiosity. He is a pet and is much sought for. More farms are being occupied by tenants who want corn only. Owners can cut fence corners and fill ditches themselves. We need more laborers or more land buyers so big farms will be cut into smaller ones. Improved machinery and high priced teams require more intelligent labor than old methods.—Pettis county.

Labor and conservation of soil fertility. We must drift into live stock or dairying.—Pettis county.

Farm help. Nearly all of our good labor has gone to the railroads and to town.—Moniteau county.

The labor problem seems to be the hardest one to solve. Farm labor is so scarce that it is prohibitive for the farmer to put out more crops than he and his family can manage. I know of lots of farmers going to the towns and cities, but not one from city to farm for the last 20 years.—Miller county.

The number of farm hands I think fully normal, but short on quality.—Miller county.

The question of help in the house is getting to be the most serious for the wife just at this time.—Cooper county.

Farm hands seem to be getting scarcer every year. Too many are drifting to town, and when once in town they would rather work there for $1 per day than go back to the country and work for $2 per day. The labor problem is getting more serious every year. The only solution will be for us farmers to divide our farms into smaller ones so that no man will have more than he himself can cultivate, and not depend on hiring any help.—Cooper county.

There is a tendency toward smaller farms and a greater demand for them. The larger farmers can't see their way around the farm labor question. Mines and public works demoralize the farm labor on account of short hours and larger wages than the farmer can afford to pay for the hours worked.—St. Francois county.

The average farmer has better and more teams and is required to use more machinery on account of the high priced farm labor, which is very hard to get at that.—Linn county.

The high price of land and the cost of running a farm is driving some of our best men to the cities or to the western countries. If this county had raised good crops this year we would not have had help to care for them.—DeKalb county.

Labor. Farmers are solving this problem to a great extent by exchanging work with each other.—Buchanan county.

The farm help that we now have is very unsatisfactory. Help for the house can hardly be secured at all. I think this is one cause of farmers going to town.—Clay county.

To keep the young men from the cities and some means to keep them on the farms.—Buchanan county.

Farm help usually gets all it earns. Their tendency is to get all they can and give as little as they can in return. Most help is unreliable. —Grundy county.

I have suitable houses for men to live in. Seldom keep a man at the house. I pay $30 to 35 per month, furnish wood, garden patch, a cow, and chicken range free, all equaling about $45 or $50 per month.—Holt county.

The labor question. I am getting my farm in grass and grazing it. You can't get hands.—Platte county.

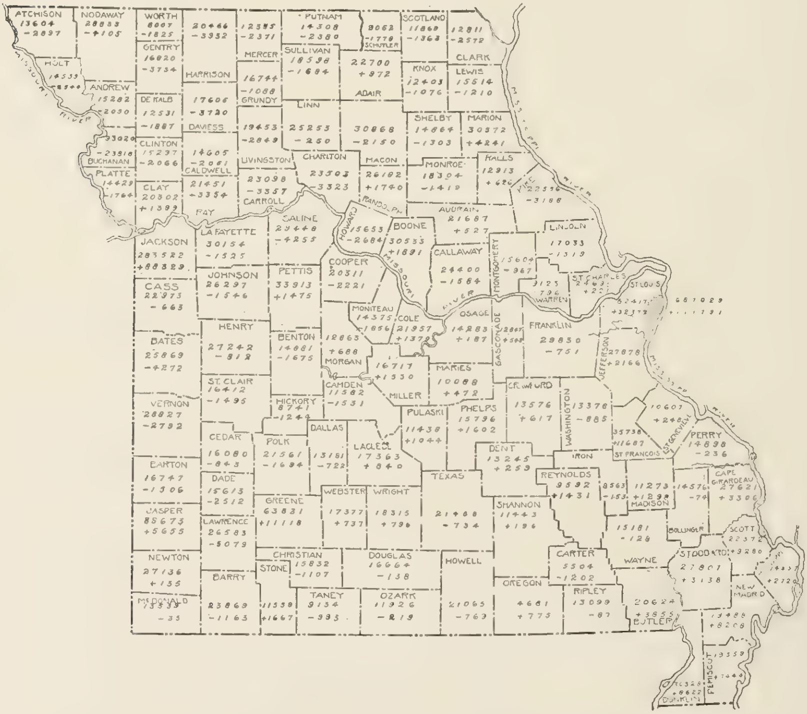
Hired help is one of the things we have to contend with, it being almost impossible to get help either in or out of doors. Most farmers trade work with their neighbors.—Benton county.

The labor question is the greatest problem—getting help and getting them to stay. Young people are marrying younger and starting for themselves. Only the drifters are left, and they are here today and yonder tomorrow.—Callaway county.

Farmers owning considerable land find it hard to get good tenants. Some farmers in this locality have simply had to let valuable and fertile land grow up in weeds for want of good tenants. Farming a lot of land with a string of hands and teams, with high wages and scarcity of house servants, means a whole lot of work and worry and an overworked housewife. Just now there is only one solution of this problem, and that is to have boys of your own; and if they are sent three or four years to a town school these boys do not want to stay on the farm any longer. It is a fact, beyond denial, that our entire school system gives but very little, if any, help or credit to the boys who return home on the common farm and help feed the world. There is too much of a tendency to boost up some country boy who, perchance, wins a little political fame, or some professor, or manager of some millionaire's estate who has money to waste.—Chariton county.

I employ farm hands, but I always employ them to board themselves. I employ married men. They make the best help. Had one married man for 13 years. A farmer's wife has more time to look after her own family when she don't have to wait on somebody else.—Chariton county.

More conveniences so that the wife and daughters might do all of their own work, as it is impossible to get house help in the country. All the colored help has gone to the towns, and the shoe factories have taken up all the white help.—Pike county.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BUTLER
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19559
+7444
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+8622
DUNKLIN

Map Showing Increase or Decrease of Population in Missouri Counties.

BUYING AND SELLING.

The farmer of today needs conditions whereby he will not have to take the merchant's price for his products, then give the merchant his price for his goods.—Dent county.

One of the greatest problems the farmer is "up against" is in buying and selling. We need some kind of a farmers' union so we could price what we have to sell. We have to let the buyer price our farm produce, and then they price what they sell to us. While I think it all right for the merchant to price his coffee, sugar, clothing, dry goods and machinery, we ought to be able to price our cattle, hogs, sheep, corn, wheat, eggs, poultry and other stuff, such as we have to sell.—Dent county.

The question of greatest need or problem is one hard to get at, but it appears to me that the correct method of buying and selling direct from producer to consumer, through organizations for that purpose, is of the most importance. At the same time such a plan would be hard to put into practice, owing to the long-established business methods. The consumer, in the majority of cases, pays about twice what the producer receives.—Carter county.

The greatest need of the farmer is to stop gambling on his products. Then, the middlemen are so numerous that the margin must be high so all can live. This means that the cost between producer and consumer is about doubled. True, we need distributing plants, but we have a surplus of middlemen, so that they must sell their goods high in order to make money. They ought to have money, but I don't think that a man should have as much for cutting up a cow as for raising her in from three to five years.—Gentry county.

We need co-operation to regulate the price of products sold.—Montgomery county.

Combinations control everything that we have to sell and buy.—Adair county.

Trusts run down the line to the retailer, who is the "king bee." He learned his lesson quick and well. A beef that sells for 5 cents per pound on foot increases to 20 cents when sold in roasts. Some farming implements have increased in price almost 50 per cent. I bought the first manure spreader in this community. I wrote ——— of the ———— manufacturers. As I did not hear from them for some time I thought it strange, but one day an implement dealer said to me, "You want to buy a manure spreader." I replied, "Yes, but how did you find it out?" Then he told me that the ——— company wrote him from Kansas City. He also informed me that the price was $125. Both he and the house were to have a big "rake off." Yet there are but few manufacturers who sell direct to farmers.—Platte county.

In spite of the much-talked-about high prices for all kind of farm products, there is a general poverty surrounding the whole farming business. In looking around in my own neighborhood I find most farmers who would need at least one steady farm hand the year 'round, doing without help because they cannot afford to pay $20 per month, which is not too much for a good man, either. I believe that the farmer is not getting a fair share of the products of his labor, because there are too many parasites (middlemen) robbing him, and it's time that the farmers should co-operate in buying and selling. Farm help is scarce because the manufacturers can pay better wages than the farmer, and our boys and girls who would otherwise much rather stay on the farm and enjoy the surroundings of their homes are going to the cities to earn more money.—Cole county.

The people in the cities may cry "Down with high priced provisions," and boycott them if they wish, but the farmers just can't produce them any cheaper and pay the high prices for farm help, and farm high priced land and pay the tariff on the necessaries of life.—Cole county.

ROADS.

We have some poor public roads in our county. Only a small per cent. of the farmers own up-to-date vehicles, on account of bad roads. —Wayne county.

The question of good roads is a big one.—Phelps county.

Farmers in this section are badly in need of a railroad. We are 20 miles from any railroad and freight is very high on everything by the time it reaches us. The farmer has to pay nearly $1 per hundred pounds on all he has to buy, laid down here. That is, he pays the merchant in purchasing his goods.—Pulaski county.

The greatest need or problem of all for the farmer is good roads. If the farmer, according to my opinion, had good roads so he could travel as well in winter as in summer there would be less trouble about hired help. The young man sometimes likes to go out, and without roads we cannot keep him on the farm. So long as the State does not undertake to take charge of the roads, we will never have any good roads.—Osage county.

I think we need a better road system. It is time we were getting out of the ruts.—Moniteau county.

The greatest problem is how to obtain good roads and maintain the same.—Saline county.

Bad roads cause trouble, nor are railroad conditions always what we would like to have them.—Butler county.

Yes, "Back to the farm" should be the cry. Automobiles are coming. Likely that will help some, but we must have good roads first.—Cape Girardeau county.

We are 12 miles from a railroad and need good roads as badly as anything else.—Hickory county.

I think a better road system is needed. I would like to see the entire tax payable in cash, and the work of each township placed in the hands of one man who would do the work or hire it done where and when needed. This would insure constant attention. I would have the overseer responsible to the county court and removable for neglect of duty.—Cedar county.

Farming in this part of Missouri should be on small tracts—40 to 80 acres—and cultivated intensively, principally with dairy and poultry farming. This would settle up the country more thickly, thus giving us more men to work the country roads to better advantage. We could then get our produce to market without so much trouble. As it now is in some of the road districts, there are but five or six men to work six miles of road, so you can imagine in what condition such roads are.—Washington county.

AUTOMOBILES AND MANURE SPREADERS.

The farmers in this township own no automobiles. In fact, desire none. About 10 per cent of them own manure spreaders, and more are clamoring for them.—Christian county.

In our little town about 25 manure spreaders were sold last spring. I know of but one automobile owned by a farmer in this part of the county. He let his get away from him and came near hurting all his family and himself.—Cass county.

The auto craze has not struck this county. With free range and plenty of horses, we "old hayseeds" think "gas machines" too swift for us.—Howell.

We need more manure spreaders and silos.—Macon county.

We want a stricter enforcement of the law for automobiles, and reckless driving. Any person caught intoxicated and driving a machine ought to be forever barred. It is dangerous to venture out on the roads with a team on Sunday.—St. Louis county.

The people of this community are slowly learning the good of clover and manure spreaders.—Grundy county.

Automobiles and other modern improvements are of recent date, but all are coming to the front very fast. One thing that has kept the farmer from buying more autos has been the bad roads a part of the year, but this difficulty has almost been overcome.—Mercer county.

So far as the man on the farm is concerned, give him good, fertile soil, good roads and an automobile, and he ''has no kick coming'' on other conditions.—Jackson county.

Manure spreaders are taking well in this part, but as yet no one has an automobile.—Benton county.

A few farmers are buying automobiles, but many more are buying manure spreaders.—Jasper county.

KIND AND COST OF EQUIPMENT.

One piece of machinery does so much more now that it is actually cheaper.—Macon county.

Machinery is no higher except farm wagons. Horses and harness 100 per cent. higher.—Ralls county.

It takes more machinery to farm now than it did 10 years ago.—Scotland county.

The reason it takes so much more machinery is lack of farm hands, and machinery has advanced in the past two years ten to fifteen per cent. Farmers have to have so much more machinery to do their work.—St. Francois county.

Most everything once was cradle, scythe, double-shovel, hoe and wagon. Now we use modern conveniences in 75 per cent. of cases.—Texas county.

It has been but few years since we had only a yoke of oxen and a bull tongue plow.—Oregon county.

Ten years ago not more than one-half of the farmers owned wagons, and about five per cent. owned spring wagons or buggies. Now all have wagons, and 75 per cent. have buggies. While horses are much better and many farmers have modern machinery.—Howell county.

The cost of farming, in the way of labor and teams, has almost doubled in the last ten years. Machinery has advanced but little, though the farmers are using more and better machinery than they did ten years ago.—Pike county.

The average farmer has better and more teams, and is required to use more machinery on account of the high priced farm labor, which is very hard to get at that.—Linn county.

Implements on the farm are better than they were ten years ago—more efficient. While the price is some higher, I would rather have them than the ones of ten years ago.—Bates county.

Some years ago the people of this section used the cheap grade of machinery, harness, etc., which cost less than the better grade goods, such as we are now using.—Christian county.

Horses are nearly double what they were ten years ago. If any difference in the cost of machinery it is cheaper, but there is more than twice as much machinery used as compared with ten years ago.—Wright county.

Ten years ago many farmers still used the walking plow and the pitch-fork. At the present day the farmer is "not in it" unless he has modern machinery.—Cass county.

The increase in the cost of equipment is due in part to increased cost of teams and tools, and in part to the more extensive equipment now considered necessary.—Livingston county.

Small farms do not seem to be as profitable as larger farms, 160 acres or more being better than 80 acres, because the more land the less equipment in proportion.—Lafayette county.

Unnecessary expenses. So many young farmers are going behind. I am a young farmer myself, not yet 30 years of age, but I have noticed that at least 25 per cent of the young farmers are going behind by buying too many of the so-called up-to-date farm implements, including engines, automobiles, etc.—Putnam county.

MISCELLANEOUS REPLIES.

Most farmers have found that if they want a wilderness they have only to rent their farm two years.—Iron county.

I think it would be better if the farmers would go to raising bushels of corn to the acre instead of trying to put out a large acreage. We had better raise 1,000 bushels on 25 acres than to raise it on 40 acres. I think this one of the greatest hindrances of people investing in Missouri land.—Scotland county.

I find among the farmers of this community a restlessness which will tend, I am fearful, toward the disintegration of well organized neighborhoods. Briefly emigration and immigration are changing our community from a homogeneous mass of well-acquainted citizens to a heterogeneous mass of people from neighboring states.—Pike county.

Large farms need to be cut into smaller ones, but farmers do not favor the plan. All seem to want more land, although they cannot get labor to save all they now raise. Renters are wanting to buy, but advance price compels them to buy smaller farms and usually poorer land than they have been farming as renters, so they are hard to deal with.—Pettis county.

The general condition of the farmers in this part of the country is very prosperous. Rural mail serves every family. All have telephones. Anything we have to sell brings a good price. What we buy is reasonable. In fact, from every viewpoint the farmers are nabobs, but all do not realize it yet.—Harrison county.

To know what to plant and how to plant it, and know what stock best to keep, and how to keep it, all for profit.—Sullivan county.

I think the farmers will have to organize before they will be really independent. There are too many farmers who are not studying their business. We will have to use the improved methods of farming before we get the best results from our farms.—Lawrence county.

There is altogether too much carelessness exercised among the farmer class, and a large per cent. undertake too many acres.—Mississippi county.

Better things will follow the manure spreader, cream separator and silo—a natural result, not a spasmodic splurge produced by mouthings of yellow press and yellow politicians.—Scotland county.

Too few farmers know about the cost of living, or of many other items.—Pettis county.

There is no doubt in my mind, but that there are a number of farmers who would be better off today if they were renters instead of so-called farmers, considering the big incumbrances held on the farm by eastern companies.—Caldwell county.

Many persons who used to rent land are either farming their own land or working for wages. Rental on good land is so high that many prefer to buy, pay interest and get the advance, rather than pay the rental.—Clinton county.

The farmers in this neighborhood are shipping their lambs together, and we have a few beef clubs. People are building better homes, a number of houses going up now with water system.—Ray county.

A marked improvement in rural schools should be brought about. Central high schools for our country boys and girls are very much desired. We need some reasonable change in money legislation, whereby the poor but worthy man can borrow money sufficient to buy him a small farm at least, thereby putting more of the people in permanent homes.—Nodaway county.

All told, I fail to see the prosperity I read so much about.—Crawford county.

Small farms are starvation and large farms are slow means of killing yourself, if you have everything in tip-top shape.—Iron county.

If the newspapers and politicians—office seekers—would have any regard for the truth, everybody would be better satisfied. They exaggerate conditions and cause unrest.—Clinton county.

Farmers in this vicinity have materially raised their standard of living. But few live as economically as they formerly did. This is probably due to the prosperous times. As yet, few farmers feel the need of modern conveniences, especially such as running water. Most new houses install a furnace and an acetylene lighting system.—Lafayette county.

We believe that the future of country life depends largely upon the working out of locally applicable plans of co-operation, perhaps as the cities are working them out, perhaps in some other way.—Livingston county.

The problem is how to do intensive farming without depleting the fertility of the soil.—Gentry county.

Owing to the piling up of promiscuous legislation on our statutes to serve special interests, the constitutional guarantee of "life, liberty and pursuit of happiness," seem to be rather an irridescent dream for the farmer.—Douglas county.

Less extravagance, more building up of soil, better cultivation, rotation of crops and diversified farming are all suggested. Then we need to raise more calves, pigs and lambs.—Chariton county.

Farmers lack representation in congress and in State legislatures. Farmers can never hope to come into their own or attain that station or respect to which they are entitled, until they have their full share of representation in legislative bodies.—Camden county.

The greatest problem is how to feed the people.—Vernon county.

We need better schools, enabling the farmer to keep the boys and girls on the farm until they are grown.—Pike county.

Greater production and less acreage will help solve the problem.—Warren county.

Not enough farmers keep books.—Greene county.

The hardest problem is how to keep the boy on the farm.—Scotland county.

There is altogether too much carelessness exercised among farmers, and a large per cent undertake too many acres.—Mississippi county.

We will have to learn how to protect ourselves so as not to be robbed by the big business organizations.—Scotland county.

The farmers' greatest need is divided between hired help, parcels post and better roads.—Scotland county.

What we need to know is how to make a fair interest on our investment, over and above a living.—Linn county.

More system, more science, good management, less acreage, and clean cultivation are all needed.—Montgomery county.

We need better appliances in order to accomplish the work of the farm with less help.—Monroe county.

The greatest problems confronting the American people today are those of farm labor and timber supply. I live in what was once a fair timbered section, but it is about all gone for railroad purposes. Farmers are having to use small poles for fence posts. Split posts are almost out of date. Farmers simply gave their timber away to the railroads and are now going to the lumber yards for lumber, which is hard pine, and we are using round poles for fence posts. At least part of them are doing this.—Schuyler county.

The greatest need of farmers in South Missouri is more land cleared and put in grass. This is a natural grass country, but it is all covered with timber and very little grass grows in the woods. Dairying is being taken up quite generally, and the profits from dairying are inducing the farmers to clear their land. This will finally be the salvation of South Missouri. Advancing prices for lumber will also help clear our timber land.—Howell county.

Farms are cropped for cash to relieve them of indebtedness, to the neglect of soil fertility. Then when the farmer wishes to sell, the buyer expects the farm to pay for itself again.—DeKalb county.

Too many well-to-do farmers are moving to town, tenants taking their places.—Clay county.

The most serious trouble with the farmers in this part is the loss of the fertility of the soil. Can't get them to build up their farms with clover or cowpeas or to rotate with other crops. Hard to get them to select seed corn any other way, but to go to the corn crib as their fathers did.—Caldwell county.

Too many young men are leaving the farms and going to the cities.—Buchanan county.

The farmer is the most independent person on earth, if he only knew it. One trouble is, he thinks the other fellow is making money too easy.—Stoddard county.

Public ownership of public utilities, such as railroads and express companies, would help. We also need a reasonable parcels post law.—Texas county.

We need something to attract the boys back to the farm.—Cape Girardeau county.

We need to increase our average crop production per acre. This section is suffering from lack of proper attention to selection of better stock and grain. However, the outlook along this line is encouraging.—Dent county.

The conservation of natural resources, especially soil fertility, is of great importance.—Franklin county.

The problem is to make the soil produce more grain at less expense.—New Madrid county.

Our greatest problem is to get our land to produce enough per acre. But I can say for our farmers that with cowpeas, clover and dairying, they are coming to the front. Some use commercial fertilizers.—Lawrence county.

Farmers here are making money, but are not yet spending for house improvements, such as running water, sewer system, heat plants, gas lights, concrete walks, etc. Some are building good houses without modern heat, light or water systems, simply because no one is offering to install these conveniences, and farmers cannot do it themselves. There is a field for commercial activity in installing heat systems, water system and light systems in the homes of well-to-do farmers. No farmer but would install acetylene lights if he could be shown the practical utility. It is also important that we learn to look up and not down on agricultural education.—Franklin county.

The following needs have been suggested to me, but I can hardly say which is the greatest, although think, perhaps, the first: First, how to build up the old land and make it yield proper returns; second, organization and education so as to be able to successfully market our products, and to buy the things we need; third, better knowledge of the uses and advantages of modern conveniences; fourth, better country roads, and how to get them.—Christian county.

Farms are going into possession of a few land owners at a rapid rate. $100 land is out of reach of poor men. This is not good for the betterment of the country. These large land owners simply lease their land to tenants with the understanding that very little if any improvement is to be made or furnished in the way of buildings, fences, etc., hence a few landlords have fine houses, and common little shanties or not much better for the renter. Now for the other side, the landlord thinks he must have one-half of the corn and one-half of the wheat if he furnish the seed, but the tenants claim this is too much when they have to take chances with the weather, and perhaps high water and high cost of teams, feed and farming utensils. So here is a rub, for much land was left idle this spring and many renters are giving up their leases and are going to farm just a few acres—enough to live. On the other hand the tenants that are really good are few. The landlord believes he ought to clear good interest on his $100 land above all expenses of taxes, etc. each year. And so here we are both dissatisfied. The cost of farming operations is greater than it used to be. Many more expensive tools and machinery are needed. Teams are high in price. Farm labor has increased in wages and much of the land is "run down." I think the solution of this perplexing question can be solved in part: First, by using four and six-horse teams to gang plows, large harrows, two-row cultivators, etc., thus saving a hand or two; second, diversified farming. say, one-third of land in grain cultivating crops, one-third in clover and grass and balance in pasture and forage for cattle and hogs; third, rotation. Weeds can be held in check by changing corn land to oats or barley, then to wheat, then to clover, and so on; fourth, maintenance of fertility. This can be done best by keeping stock of some kind on the farm. But this system is hard to carry out with or by the average renter. About all the renter can do is to raise corn, and perhaps some wheat, and year after year corn is put on the same ground just because the land is being leased out to renters one year only at a time. Now, I believe our Agricultural College Farm Management Department could do great things for Missouri farmers and tenants in general by showing a remedy for this evil. And the evil is, landlord and tenant want to get it all at one jump and give nothing back to the soil in fertilization. It would pay to let part of the land rest by rotation to a different crop.—Chariton county.

THE FARM HOME AND WOMEN'S WANTS.

Light and heat systems, with power for running churns, washing machines, etc., would help with the work in the farm home.—Harrison county.

The woman should, just as far as possible, arrange the house to suit herself, as she will then find more enjoyment in taking care of things. A house cannot be too handy. The water system, furnace and lighting are the things most needed.—Chariton county.

Need cement walks and better drainage to and from barns and outhouses.—Grundy county.

If it were possible to have a storage battery to heat and light the house and to use in cooking, this would certainly be the greatest improvement, but it may not be among the possibilities.—Gentry county.

Some needs are, more help in the house, running water, furnace heat and light plant. We would like to have a more modern home, but material and labor are so high that it is almost impossible for the ordinary farmer to have many improvements.—Buchanan county.

The husband should take an interest in making the place attractive with good fences, attractive lawns and well-kept shrubbery.—Ripley county.

We have a new farm house and have made same modern in every respect, except fans, and the hot days of summer make us believe that these are most needed.—Buchanan county.

A concrete floor for each porch, walks to gates and to woodhouse, and concrete around cistern or well would be desirable improvements.—Oregon county.

We have a modern water system. Were we without this would think it the improvement most to be desired.—Camden county.

We have a good many wishes, but very few fulfillments.—Gasconade county.

We need good help in the house more than anything else.—Monroe county.

We have the only water system there is in any farm house in the neighborhood. It is supplied with hot and cold (cistern) water. We also have a pump connecting with both well and cistern, so that we can get water from either. This, in my opinion, is the greatest help to the housewife of today.—Dade county.

An up-to-date laundry and dairy room, with running water and gasoline power would be most desirable.—Scotland county.

We have a water system and consider it the greatest improvement about the house.—Audrain county.

Women wish for a cooler way of cooking, washing and ironing.—Moniteau county.

Heat, light and water equipments in the farm home have been increasing four or five years, but such things come slowly.—Pettis county.

A good, industrious wife on the farm makes the plow run easy and the mower sing a sweet song.—Butler county.

Running water, hot and cold, with power washing machines help wonderfully. I have them and know.—Jefferson county.

We built a new house last year, and put in running water and a kitchen sink and a sewer to carry away the waste and water. It it one of the greatest helps I have ever seen in doing up the housework.—Madison county.

Would like to have a good cellar to keep milk, vegetables and fruit.—Wayne county.

In my opinion, the greatest improvement would be some invention to help with the washing and other hard work. Help for the house is very unsatisfactory and hard to get.—Clay county.

Give me running water in the house, with regular, contented help at good wages.—Clay county.

Would like to have large porches instead of small porticos.—Cape Girardeau county.

RECOMMENDATIONS AND REVIEW.

The foregoing figures, together with the personal replies, representing only a part of those received, are sufficient to give a valuable insight into country conditions, or as it might be expressed, farming from the farmers' viewpoint.

Of first importance, and perhaps of greatest interest are some general, and often overlooked, truths that are brought out in this farmer folk's forum. One of these is that the student of rural conditions who considers country people as apart from and differing from all others, yet thinks of the dwellers in the rural districts not so much as individuals, but as a class, is making a mistake.

Distinctions, measured in money, are perhaps not so marked among country people as among dwellers in the crowded cities, for, in the main, the country makes neither millionaires nor mendicants—just men. On the other hand, as is indicated in the preceding pages of this bulletin, quite as many and as widely divergent views are entertained by country people as by the dwellers in the cities. This fact is familiar to all who really know the farm, yet it is one that even some careful students of country conditions fail to readily recognize. It would be a difficult matter to determine the exact type of the typical farmer, yet the attempt is often made. Some write of "The Country Woman," or choose a similar caption while considering all mothers, wives and daughters in country homes as belonging to practically the same class—a class differing radically from that found in the cities, yet, because of country conditions, all having similar aspirations, tastes, hopes, talents and tasks.

Equally as erroneous are many other views, such as often find expression in print. Sometimes we are given a dark, sordid and distorted view of the country. The days are long, the work monotonous, conveniences are few, there is much of drudgery, and but little of cheer and content. Again, it is a pleasing picture of pleasure and plenty that is painted of country people. The farm home, with up-to-date water, light and heating systems, is modern in every respect; labor saving devices have done away with all drudgery and most of the ordinary work; travel from farm to town is by automobile, and life, made up most of leisure, is ''one glad song.''

As pen pictures of the average country home, both the gloomy and the glad representations are wrong. As is shown by reports of correspondents, the farm homes that somewhere near approach the latter description are as yet comparatively few, but it is our belief that even now they far outnumber those where discontent and drudgery dominate.

Despite the unfilled demand for hired help both in the field and in the house, despite the many other difficulties mentioned, the country is today, more than ever before, a good place to live—but not as good as it is going to be. With rural mail service and country telephones here, and with better roads, a necessary aid in the revival of the country church and the establishment of the real rural school, the future of country life seems full of promise. True, life in the country is going to demand more than it ever before demanded, but it is going to give more than it ever before gave. There are great rural problems, but even the limited insight given in the facts and views set forth in this bulletin, leads us to believe that they will, in the main, be solved by those who derive their living direct from the land and who love country life. Aiding these, will be the agricultural teacher, not the agitator; the practical professor, not the professional politician.

That there is need of scientific agriculture—or, let us say, better methods of farming—is coming to be recognized quite as much by the farmer as by the teacher.

Agricultural colleges are crowded and the demand for farmers' institutes and agricultural short courses is constantly on the increase. Large investments and low yields do not point the way to agricultural prosperity. With Missouri farm land showing an increase in value of 100 per cent., the total expenditure for labor showing an increase of 89 per cent., fertilizers an increase of 78 per cent., and the total value of farm implements and machinery an increase of 78 per cent. (according to preliminary census figures), and an estimated advance of 41 per cent. in the wages of farm hands, and of 46 per cent. increase in the pay of help in the house, all within ten years, there should be a corresponding increase in farm efficiency and productive power. We must do better farming if we are to realize such a result. The need, with help hard to get, is not so much for bigger farming as for better farming, not so much for added acres as for added bushels. Changed location, perhaps, more than crop rotation, careful seed selection and proper cultivation, gave the pioneer a land productive of plenty. Today free land, or even cheap land, is practically in the past. Men can no longer afford to "skim the cream" off 160 acres of land, then move to another "quarter section." It is not for us to condemn the farming methods of our forefathers; however, we should recognize the fact that changed conditions demand new methods.

Important as it is that we should increase our crop yields per acre, it is not of more importance than that we should decrease the cost of production. To do so may benefit both the producer and the consumer. If a lower cost of production can be made to mean a wider margin of profit and at the same time a steadier and more reliable market than phenomenal—and to many would-be purchasers prohibitive—prices can ever bring, it is easy to see how the farmer is helped. It is possible for larger profits to come, even with lower prices; and in this connection it may be said that the farmer should know the cost of crop production, for this knowledge may prove to be the first step in reducing the cost.

Closely connected with crop production is marketing. Many believe that, with the elimination of so many "middle men," the growth of country co-operation and farmers' mutual movements, and the development of a from-country-to-customer trade, it is possible for the producer to receive more for his farm products while the consumer pays less. That this question of marketing is being given considerable thought is indicated by the replies received from correspondents of the Board of Agriculture. In many sections, farmers and merchants are together co-operating, thus building up better towns and better country communities. The merchants encourage the raising of better poultry and the growing of better crops, then pay better prices for premium products. Encouragement is given in the holding of farmers' institutes and agricultural short courses, in the belief that the lasting benefit for good will mean more than "free street fairs." Where such conditions obtain, there is seldom much talk of "merchants robbing the people," or of the growth of the "mail order business."

We have mentioned briefly the need of preparation on the part of those who are thinking of going from city to country, and here we would place emphasis upon this point. As has been recently written, ''Running a farm is a business proposition nowadays—nothing else. It demands plain business sense; and business sense dictates that the man shall know all he can about what he proposes to do before diving headlong into it.'' In this day of much lurid land literature, of exploitation through press and pamphlet, and from platform—exploitation by experts—novices are sometimes advised to rush in where veterans fear to venture. Placing people on farms will not necessarily make farmers, but may, unless they are thoroughly equipped, make failures. Those who heed ''the call of the country'' should seek to see the practical and the prosaic as well as the poetic and the emotional side. If the world is to be fed it must be by men who know how to farm. We would not discourage the man whose ambition it is to own a home in the country, but in simple justice he is entitled to see both sides of the shield, to be told the plain truth, rather than see the truth through a magnifying glass. It is not the purpose of this bulletin to check the movement to the country, but rather to increase it, insofar as it concerns those who understand the step and who are qualified to make it, for the paramount problem is to keep enough men on the farms to feed those in the factories. It is, then, of the utmost importance that country conditions be such as to encourage those now on the farms to stay there. Even if the farmer feels that he is entitled to retire from active work it is nearly always better for himself, better for the country—and sometimes for the town, too—that he retire on the farm.

The following from Agricultural Education, published by the Kansas Agricultural College, is to the point:

''The best panacea for the condition of unrest and dissatisfaction with rural life is a joy in excellence of production. I do not find that the boy who, by intelligent study and scientific management, is able to produce seventy-five bushels of corn per acre or who is able to win a premium at a fair on a well-groomed colt, is at all dissatisfied with country life. The girl who is able to win a prize at the farmers' institute for the best loaf of bread is not usually fretting because she cannot clerk in a millinery store. Joy in doing things well drives out the spirit of unrest. The pride that comes with increased power—power to grow corn or stock, power to bake or sew, and do it well—will dignify the daily duties of the farm and home. The joy in seeing things grow, the trees to bud and flower, the corn to grow and put forth its blades, the ear, and then 'the full grain in the ear,' the flowers to put forth their blooms, only for the few, careless, whether seen by man or not—this joy can come only in the country, and blessed are the boys and girls who have the opportunity to live where nature seems most to live."

A powerful agency for good in the country chaos (largely a result of the back-to-the-land movement) of today is the agricultural and country press. The pages of such papers are the people's forum—and more. A good agricultural paper gives to each of its readers a free agricultural course by mail and at the same time many a man is taught to appreciate the beauties of the world about him—his own and God's.

Slowly, it sometimes seems, but surely, is the all-embracing problem of country life being solved by those in sympathy with it, and as the work progresses the country more and more becomes a good place in which to live, but a poor place to leave.

THE MISSOURI STATE FAIR AS OTHERS SEE IT.

John T. Stinson,
Secretary.

Today Missouri has a million dollar exposition, with a score of substantial buildings of brick and steel, located in the beautiful State Fair Grounds Park at Sedalia, where only a decade ago was a Missouri farm about which there was nothing to indicate that it was soon to be the meeting place for thousands of people and the battle grounds for the champions of the live stock world. The initial meeting was a revelation to Missourians, just as later meetings have been to the nation at large. Best of all, the growth has been as permanent as it has been phenomenal. With past achievements looming large, the 1911 meeting, September 30 to October 6—"Always the first week in October"—promises to be a pace-maker. Some press comments concerning the 1910 fair follow:

Missouri's 10th annual State fair, held at Sedalia last week, was the best balanced and most comprehensive agricultural show ever made by that State. All departments were admirably furnished with exhibits, the net result being a harmonious, proportioned index of Missouri's new agriculture. A larger percentage than usual of the attendance were farm folk. Every agricultural region of the State contributed visitors, most of whom had not seen the fair before. Under the aggressive publicity policy which Secretary J. T. Stinson, aided by W. L. Nelson and others, has been following the past few years, the fair has been heard of in every county in Missouri. Citizens quite generally now know that their State has a permanent, dignified, excellently-equipped and high-ranking agricultural exhibition at Sedalia, and they have begun to accord it an encouraging measure of support. Their pride in it is abundantly justified. It is staged on a pleasing elevation of Pettis county prairie, flanking corn fields on the west, and accessible by two railways, on which a shuttle service was given during the week, and a trolley line from Sedalia. Its permanent buildings of brick, concrete, steel and stone are among the most attractive, substantial and convenient to be seen in America. To the equipment this year was added a woman's building, with large airy rest rooms and every facility for the comfort and delight of women and children. To the rear of this $40,000 structure, which is strikingly picturesque, a large enclosure, provided with sand piles, swings, a toboggan and other fixtures, fairly teemed with youngsters who had been quick to recognize their own. It may be doubted whether a happier idea than that which this handsome building with its large yard has put into effect has ever been evolved in connection with a State fair. It is worth copying on every state fair grounds. It would be too much to say of the Missouri State Fair that it is the greatest in America—giants do not attain their full growth in 10 years. It may, however, be said that from an educational standpoint it is superior to most and second to none. In it there is more of the good and less of the bad—more to commend and less to censure—than in almost any other great state show. Everywhere there is something to see and study. Even from the first meeting the educational idea has been uppermost in the minds of the fair managers—and a decade has not seen it dimmed. Instead, it has gained in strength. The fair has always been clean. There is no market for ''gold bricks'' in Missouri. The Missourian of today—at least the Missourian who attends his State fair—is more interested in learning how hog cholera serum is manufactured, how to spray fruit trees, how to build a good silo, or how to grow more corn, or to raise better poultry, than he is in listening to an agent tell about some so-called wonderful (but worthless) device given as a premium with the purchase of every prize package. This tersely tells the tale. It accounts for the educational idea which was so much in evidence at Sedalia.—Breeder's Gazette, Chicago.

The tenth annual State fair was opened at Sedalia, Missouri, October 1, and closed Friday, October 7. The greatest and most satisfactory fair ever held. An educator and a potent influence in the advancement of the agricultural interests of the great State of Missouri. The corn show alone was worth a week's time and expense to any progressive farmer. The grand parade of cattle and horses Friday morning, wearing the ribbons awarded, was of the nicest of its kind ever made at any state fair. The Missouri State Fair management's only aim is to promote public welfare. There has been nothing selfish or narrow in its impulses or designs. It is arranged upon a system which is the result of years of experience, and it is the ardent wish of the men in control of the State fair management to make Missouri State Fair purely educational and inspirational.—Kansas Farmer.

The tenth annual State fair is a worthy compliment to "Missouri, the Imperial State, within whose hospital borders there is of room and plenty for the millions." It bespeaks an awakening. It emphatically declares for a new Missouri; a State in which peace and plenty shall reign supreme, representing an intellectual and industrial development which has no superior. The resources of this great commonwealth are reflected from every angle, in that exhibition to which every true son and daughter of the State will point with a deserving pride. The Missouri State fair of 1910 is a well balanced exposition. It is one which maintains a degree of perfection hitherto unattained. It is a show which pleases every comer. It is educational and instructive, carrying with it an element of commercial value to every one who passes within its gate. It more completely sets forth the chain of commercial activities represented than has any previous exhibition. It has no real high spots, but admits of comparison only in the superlative degree. There is something doing every minute. Something to see that will instruct as well as amuse. In fact it is the full worth of the price paid to see it.—Daily Drovers' Telegram, Kansas City.

Not to be outdone by her sister states in the matter of a State fair, Missouri held at Sedalia this week the best and most satisfactory show of any in its history. Not a year in the last ten has the increase in all departments been so marked, the attendance so large or the interest so keen as this year. There were so many entertaining features of merit that to attempt to see them all was to attempt an impossibility. Over 3,000 animals were entered in the different departments of the live stock show, representing the best herds, flocks and studs of the country. In many of the breeds the best show of the year was made, and not since the World's Fair at St. Louis has there been such a showing of mules in the State. In the cattle departments the entries were large and of excellent quality, and in the swine and sheep departments the Missouri standard was kept high.—The Breeders' Special, Kansas City.

There is an appearance of permanency about the State fair buildings at Sedalia which impresses every visitor. When the fair was organized its officials set themselves to erect buildings which would last. They had profited by the experiences of other states, which had erected frame barns and buildings, and then year after year spent large sums of money repairing and improving and replacing. The Missouri officials realized that it was economy to build well and durably in the beginning. And so they saw to it that every building was put up as solidly and as substantially as though it were to be used the year around as the permanent home of the finest live stock and machinery. The result is most pleasing to the eye and most gratifying to exhibitors and visitors alike. Not a stable but is of brick, with cement floor, kept in the best of order and condition. The live stock pavilion is an architectural adornment to any state fair ground, and commodious and comfortable in the extreme. The poultry building, agricultural and horticultural building, art hall, State University building—without exception, the structures are good for a quarter of a century or more to come, with little outlay for upkeep. There are many other state fairs which could well afford to go to Missouri and learn a lesson in the economy of large outlay in the beginning.—Farmer and Stockman.

Having its inception under the discouraging conditions coincident with inclement weather such as has marred the opening of practically every State fair of the year, the tenth annual State fair of Missouri triumphed despite handicaps and set a new high mark of enthusiasm and progress. Attendance, quality and quantity of exhibits, amusement features and general interest in the fair seem to have surpassed all previous years' records, and the people of Missouri are admittedly proud of the great show staged at Sedalia the week of October 1-7. There's a freshness and wholesomeness in the welcome extended upon arrival, and the visitor's flattering opinion is only intensified by subsequent contact with the citizens. Missouri has one of the best corn shows the writer has ever examined, not excepting the National Corn Exposition's great showing! Truth to tell, as a well known agricultural writer and close observer remarked: ''Missouri hasn't made quite so much noise about corn improvement as some states possessing high class press agents, but she has gone ahead faster in corn improvement than any corn belt State.'' That's an exceedingly strong statement, yet I believe the exhibit of corn this year almost justified this optimistic statement.—Twentieth Century Farmer.

Great stress has always been placed upon the educational features of the Missouri fair, and this year all previous efforts were surpassed. From the University of Missouri exhibit, said to be the most complete of the kind ever made at any state fair in America, to the entries by hundreds of rural schools throughout the State, there is much to see and study, to uplift and inspire. The management of the fair has always placed manhood above money, never catering to the common or selling to fakirs the right to fleece its patrons.—Orange Judd Farmer.

MISSOURI CROP REVIEW FOR 1910.

(By W. L. NELSON, Assistant Secretary.)

The total value of Missouri farm crops for the year 1910, estimated at local prices prevailing December 1, is $199,546,661. This is more than a dozen times as much as was paid, a little more than a century ago, for all that vast territory included in what is known as the Louisiana Purchase, and of which the present State of Missouri is a part. The crops that go to make up two hundred million dollars' value, to put it in round numbers, are corn, wheat, oats, tame hay and forage, prairie hay, flax, rye, buckwheat, barley, broom corn, cotton, potatoes, tobacco, sorghum seed, sorghum syrup, clover seed, timothy seed, kaffir corn, millet, cowpeas, castor beans and other minor crops, including vegetables. Live stock, poultry and orchard products are not represented.

Corn.—Missouri's total yield of corn for the present year is placed at 252,472,100 bushels, the average yield for the entire State being 32.4 bushels per acre, or five bushels—or to put it in Missouri measure, one barrel—more than last year. This year's yield is also considerably above the 10-year average of 28.8 bushels per acre. Missouri has had a few somewhat more favorable seasons for corn growing, the spring being cold and wet, making it necessary to plant much corn a second time, but what was lacking in favorable conditions was more than made up by careful seed selection and better cultivation—a result, in large measure, of Missouri's corn campaign conducted by the State Board of Agriculture and Agricultural College. The very favorable weather for the month of March enabled farmers to make fine progress with their work, it being estimated that 31 per cent. of the corn ground had been planted by April 1. Early April weather was also fine and the soil was in excellent condition, 94 for the State, so that correspondents reported 46.7 per cent. of the corn planted by May 1. This was twice as much corn as had been planted by May 1, 1909, but the seeming advantage gained was not realized. Too much rain and cool weather during the month of May delayed the completion of corn planting and prevented a good stand from the earlier planting. On June 1, when the condition of corn was reported as 67.2, the estimated per centage of the corn planted throughout the State was only 80.5, as compared with 91.2 one year before. Of the part planted previous to June 1, it was estimated that 28 per cent. had been or would have to be planted over. Complaints of poor stands were general and a number of correspondents reported corn to be planted over a second time. By July 1 the condition of corn had advanced to 75.9, but was still below the ten-year average of 82.5. At this time some corn had been laid by, and much was being given the last plowing, yet there was then about two per cent. of the crop to be planted. The first half of June was very wet in most sections of the State, except in the northwest part, where there was lack of rainfall throughout the season, resulting in a corn yield considerably below the average usually made by the counties covered. Much corn in many parts of the State was "laid by" in poor condition, owing to excessive rains or hard winds which blew down the corn. August rainfall, while poorly distributed, was generally sufficient to meet the needs of growing corn, so that there was but little loss from drouth. On October 1 it was estimated that only 70.6 per cent. of the corn crop was safe from frost, as compared with 90.8 one year before. Fortunately, the first killing frost came very late, allowing time for all except the very late planted corn to mature nicely.

The 1910 corn acreage is placed at 7,795,786, an acreage never exceeded in the history of the State. Two causes are largely responsible for the immense number of acres harvested. Practically no corn was lost by overflows in the river bottoms or their tributaries, while in other years millions of acres of corn had been lost in this way. The other item of increased acreage comes in wheat ground plowed up last spring and planted to corn.

It is gratifying to note that Missouri has increased her corn yield per capita from 59 bushels in 1900, to 72.5 bushels in 1910, a gain of 13.5 bushels in a single decade.

The farm price of corn in Missouri this year is given as 42.7 cents, or 15.4 cents less than last year, when it was 58.1 cents. As a result of this decidedly lower price the total estimated value of this year's corn crop is only $107,919,354, or approximately seven million dollars less than last year.

The quality of this year's corn crop is placed at 89 for the State. While the quality is generally good, there is considerable complaint of soft and poorly matured corn in limited districts.

The leading county in the State, in point of yield per acre, is St. Charles, with 46 bushels. Other leading counties, by crop division sections are as follows: Northeast, St. Charles, with Marion, 45, second; Northwest, Lafayette and Platte, 37 each; Central, Cole, 40; Southwest, Christian and Greene, 36 each; Southeast, Franklin, 43. Saline is the leading corn county of the State in total number of bushels produced, its estimated yield being 6,838,092 bushels. Other leading counties, by sections, are: Northeast, Audrain, 4,645,728; Northwest, Nodaway, with 6,374,754 bushels, and Atchison with 5,663,936; Central, Saline, 6,838,092; Southwest, Vernon, 3,864,550; Southeast, Franklin, 1,882,530.

A comparison of the corn crops for the years 1909 and 1910 shows the following:

1909.

	Acreage.	Average yield per acre, bushels.	Total yield, bushels.	Value.
Northeast	1,389,852	27.9	38,783,278	$22,442,122
Northwest	2,165,798	28.5	61,794,925	36,585,579
Central	1,155,823	30.8	35,640,443	19,983,594
Southwest	1,631,422	23.	37,593,785	21,634,061
Southeast	862,501	26.7	23.902,515	14,198,688
State	7,205,396	27.4	197,714,946	114,844,044
1910.				
Northeast	1,535,921	38.8	59,621,670	$23,267,678
Northwest	2,469,439	32.2	79,413,086	34,359,779
Central	1,223,801	31.5	38,585.049	17,032,713
Southwest	1,653,335	27.	45,414,628	19,462,985
Southeast	913,290	32.	29,437,667	13,796,199
State	7,795,786	32.4	252,472,100	107,919.354

Wheat.—The wheat yield of Missouri for the year 1910 is placed at 22,001,890 bushels, or an average of 13.2 bushels per acre, as compared with a total yield of 27,502,879 bushels and an average yield of 15.3 last year. At the average farm price of 87.1 cents per bushel, this year's crop represents a value of $19,170,143, as compared with $29,608,414, the estimated value of last year's crop, the average farm price for wheat being $1.07 one year ago. This year's average wheat yield per acre is just one-half bushel below the 10-year average, the decided decrease in total number of bushels resulting largely from the shortage in acreage harvested, only 86.6 per cent., or 1,666,810 acres of the 1,923,887 acres seeded in the fall of 1909 having been harvested. Much wheat was winter killed or came through in such poor condition that it was not thought advisable to let it stand. The greatest loss in this respect was in the Central section of the State. The wheat yield by sections was Northeast, 12; Northwest, 16; Central, 10; Southwest, 14; Southeast, 14.

The leading wheat county of the State for the year 1910, in point of total production, is Franklin, in the southeast crop division section, with 972,132 bushels. In the northeast section St. Charles leads with 779,002 bushels; northwest section, Platte, with 679,360 bushels; central section, Cooper, with 362,700 bushels; southwest section, Jasper, with 807,012 bushels. The county leading in wheat production per acre is Pemiscot, in the southeast section, with an average of 25 bushels. Scotland, with 18 bushels, leads in the northeast section; Platte, with 22 bushels, in the northwest section, and Jasper, with 18 bushels, in the southwest section.

The 1910 fall seeding of wheat is placed at 1,881,016 acres, or 97.8

per cent. as compared with the seeding one year ago, when the ground seeded was 2.4 per cent. greater than in 1908. The present condition of the wheat crop is only 76.2 for the State, there being considerable complaint as to lack of rainfall. Wheat condition, by sections, is: Northeast, 78; Northwest, 79; Central, 75; Southwest, 77; Southeast, 72.

Oats.—Missouri this year produced a "bumper" crop of oats, the total yield for the State being placed at 25,071,115 bushels, as compared with 18,808,576 bushels in 1909, or 16,143,862 bushels as the average of the total State yield for the last seven years. The average yield of oats per acre for the year 1910 was 33.2 bushels, as compared with 26.9 bushels last year, or a 7-year average of 22.6 bushels. Not within the last decade has the State produced any other such crop of oats. At the estimated farm price of 30.3 cents per bushel, the value of the 1910 oat crop is placed at $7,605,185. The acreage this year was 755,754, as compared with 698,653 last year. The Northeast section of the State leads with 243,331 acres and a total estimated yield of 8,080,199 bushels.

In average production per acre Jasper county, in the southwest section, leads with 43 bushels of oats. Other leading counties by crop division sections are: Northeast, Macon and Shelby, 40 bushels each; northwest, Nodaway with 42 bushels; central, Cole with 38 bushels; southeast, Jefferson and Ste. Genevieve, with 40 bushels each. Knox, in the northeast section, leads in total oat production with 1,812,300 bushels. Other section leaders are: Atchison, 818,890 bushels, in northwest; Callaway, 428,468 bushels, in central; Jasper, 635,282, in southwest, and Franklin, 197,505, in southeast.

Summary.—On the following pages covered by this article are tables giving acreage, yield and value of principal crops grown in Missouri in 1910, also some statistics as to live stock:

CORN, HAY AND FORAGE.

Table giving acreage, average yield per acre, and total product of corn and hay and forage, by counties, for the year 1910:

	Corn.			Hay and Forage.	
	Acres planted.	Average yield per acre, bushels.	Total yield per county, bushels.	Acres.	Total yield per county, tons.
State	7,795,786	32.4	252,472,100	3,485,503	4,886.011
County.					
Adair	76,954	37	2,847,298	73,309	109,964
Audrain	129,048	36	4,645,728	57.801	115,602
Andrew	128,642	29	3,730,618	30,714	43,000
Atchison	176,998	32	5,663,936	18,952	26,533

CORN, HAY AND FORAGE—Continued.

County.	Corn.			Hay and Forage.	
	Acres planted.	Average yield per acre bushels.	Total yield per county, bushels.	Acres.	Total yield per county, tons.
Barry	53,418	35	1,869,630	14,229	17,786
Barton	97,969	26	2,547,194	25,712	35,997
Bates	158,326	20	3,166,520	59,623	59,623
Benton	57,991	26	1,507,776	30,683	46,025
Bollinger	33,074	37	1,223,738	11,891	16,447
Boone	95,395	32	3,052,640	53,570	58,927
Buchanan	72,172	36	2,598,192	20,806	35,370
Butler	20,808	27	561,816	7,818	9,773
Caldwell	105,533	31	3,271,523	48,259	67,563
Callaway	94,419	32	3,021,408	62,962	100,939
Camden	27,175	34	923,950	13,418	18,785
Cape Girardeau	32,714	34	1,112,276	21,250	31,875
Carroll	148,462	35	5,196,170	48,957	83,227
Carter	11,238	30	337,140	2,460	3,444
Cass	110,853	26	2,882,178	73,838	110,757
Cedar	56,068	20	1,121,360	17,480	29,716
Chariton	75,875	33	2,503,875	62,166	87,032
Christian	47,975	36	1,727,100	13,876	18,039
Clark	105,856	40	4,234,240	56,306	78,828
Clay	92,142	34	5,047,708	23,637	37,819
Clinton	114,652	35	4,012,820	37,780	45,336
Cole	25,609	40	1,024,360	17,750	28,400
Cooper	82,038	36	2,953,368	25,851	41,362
Crawford	30,956	32	990,592	15,698	20,307
Dade	61,708	31	1,912,948	17,765	26,648
Dallas	48,874	30	1,466,220	20,160	26,208
Daviess	126,492	29	3,668,268	65,159	97,739
DeKalb	118,005	25	2,950,125	40,740	57,036
Dent	31,696	26	824,096	18,291	20,120
Douglas	44,308	28	1,240,624	15,237	17,523
Dunklin	47,937	28	1,342,236	6,900	10,350
Franklin	48,270	39	1,882,530	27,876	47,389
Gasconade	19,541	39	762,099	12,896	20,634
Gentry	140,869	26	2,726,594	52,495	57,745
Greene	85,029	36	3,061,044	26,334	34,234
Grundy	88,787	30	2,663,610	61,693	98,709
Harrison	148,980	32	4,767,360	81,057	137,797
Henry	121,716	21	2,556,036	40,887	51,109
Hickory	31,822	20	636,440	16,160	25,856
Holt	109,311	28	3,060,708	11,671	16,339
Howard	53,227	28	2,022,626	27,240	43,584
Howell	53,909	29	1,563,361	13,650	16,380
Iron	15,242	30	457,260	8,678	11,281
Jackson	106,540	35	3,728,900	42,069	67,310
Jasper	84,368	32	2,699,776	19,533	29,000
Jefferson	42,064	39	1,640,496	19,520	28,304
Johnson	112,633	26	2,928,458	60,604	90,906
Knox	72,072	38	2,738,736	52,176	52,176

CORN, HAY AND FORAGE—Continued.

County.	Corn.			Hay and Forage.	
	Acres planted.	Average yield per acre, bushels.	Total yield per county, bushels.	Acres.	Total yield per county, tons.
Laclede	38,889	33	1,283,337	26,751	34,776
Lafayette	126,026	37	4,663,962	40,330	76,627
Lawrence	74,739	33	2,466,387	11,212	16,818
Lewis	65,405	42	2,747,010	53,127	66,409
Lincoln	76,018	41	3,116,738	22,866	38,872
Linn	89,636	35	3,137,260	91,923	147,077
Livingston	120,154	35	4,205,390	50,650	70,910
McDonald	26,609	31	824,879	10,527	15,791
Macon	94,949	36	3,418,164	93,577	116,971
Madison	17,512	30	525,360	10,753	16,130
Maries	24,766	30	742,980	10,736	13,420
Marion	59,617	45	2,682,765	31,488	40,934
Mercer	76,176	33	2,513,808	70,356	77,392
Miller	34,898	28	977,144	16,464	21,403
Mississippi	43,376	38	1,648,288	4,130	4,956
Moniteau	45,281	25	1,132,025	26,775	34,808
Monroe	113,777	36	4,095,972	71,085	106,628
Montgomery	72,791	33	2,402,103	25,939	44,096
Morgan	36,962	36	1,330,632	23,908	23,908
New Madrid	42,891	33	1,415,403	2,851	4,847
Newton	47,623	30	1,428,690	12,776	21,719
Nodaway	236,102	27	6,374,754	65,258	81,573
Oregon	26,836	31	831,916	5,403	5,943
Osage	26,838	26	697,788	12,198	18,297
Ozark	26,120	25	653,000	3,969	4,763
Pemiscot	21,900	38	932,200	1,069	1,604
Perry	26,655	33	879,615	11,111	13,889
Pettis	111,773	27	3,017,871	41,188	57,663
Phelps	30,437	27	821,799	19,517	24,396
Pike	88,410	41	3,624,810	43,811	76,669
Platte	61,908	37	2,290,596	14,963	22,445
Polk	67,393	31	2,089,183	32,789	39,347
Pulaski	31,863	32	1,019,616	14,249	19,949
Putnam	68,066	40	2,722,640	81,820	102,275
Ralls	62,874	40	2,514,960	38,720	58,080
Randolph	59,722	32	1,911,104	27,387	30,126
Ray	147,226	32	4,711,232	44,569	75,767
Reynolds	13,959	30	418,770	7,791	8,570
Ripley	27,648	27	746,496	5,004	7,006
St. Charles	39,785	46	1,830,110	19,320	28,980
St. Clair	73,418	20	1,468,360	29,623	38,510
St. Francois	16,338	26	424,788	11,355	11,355
Ste. Genevieve	16,168	39	630,552	8,237	10,297
St. Louis	38,694	43	1,663,842	31,980	63,960
Saline	189,947	36	6,838,092	32,580	58,644
Schuyler	45,913	36	1,652,868	38,665	42,532

CORN, HAY AND FORAGE—Continued.

County.	Corn.			Hay and Forage.	
	Acres planted	Average yield per acre bushels.	Total yield per county bushels.	Acres.	Total yield per county tons.
Scotland	73,232	41	3,002,512	50,401	70,561
Scott	37,875	31	1,171,335	7,015	9,120
Shannon	21,418	28	599,704	6,041	7,551
Shelby	95,330	41	3,908,530	50,902	58,537
Stoddard	57,842	29	1,677,418	7,607	9,505
Stone	33,837	32	1,082,784	7,363	11,045
Sullivan	80,335	40	3,213,400	106,729	106,729
Taney	27,268	33	899,844	3,350	4,355
Texas	59,656	26	1,551,056	26,334	28,967
Vernon	154,582	25	3,864,550	59,739	68,700
Warren	25,853	42	1,085,826	11,143	22,286
Washington	30,680	32	981,760	11,957	13,751
Wayne	26,863	28	741,524	10,833	16,250
Webster	46,667	33	1,540,001	22,387	29,103
Worth	60,262	26	1,566,812	25,975	44,158
Wright	40,708	34	1,384,072	21,340	25,608

WHEAT AND OATS.

Table giving acreage, average yield per acre, and total product of wheat and oats, by counties, for the year 1910:

	Wheat.			Oats.		
	Acreage.	Average yield per acre, bushels.	Total yield per county, bushels.	Acres.	Average yield per acre, bushels.	Total yield per county, bushels.
State	1,666,810	13.2	22,001,890	755,754	33.2	25,071,115
County.						
Adair	1,810	16	28,960	4,289	39	167,271
Audrain	862	12	10,344	25,202	28	705,656
Andrew	5,248	20	104,960	6,372	36	229,392
Atchison	4,261	20	85,220	24,085	34	818,890
Barry	26,306	16	420,896	4,830	37	178,710
Barton	10,091	16	161,456	11,029	40	441,160
Bates	18,995	14	265,930	17,037	26	442,962
Benton	13,046	12	156,552	7,836	33	258,588
Bollinger	15,324	10	153,240	4,337	30	130,110
Boone	20,556	10	205,560	7,233	30	216,990
Buchanan	24,942	18	448,956	3,595	41	147,395
Butler	1,012	13	13,156	1,539	28	43,092
Caldwell	1,784	14	24,976	3,215	33	106,095
Callaway	21,301	10	213,010	12,602	34	428,468
Camden	6,603	12	79,236	3,223	30	96,690
Cape Cirardeau	41,255	13	536,513	5,439	36	195,804

WHEAT AND OATS—Continued.

County.	Wheat.			Oats.		
	Acreage.	Average yield per acre, bushels.	Total yield per county, bushels.	Acres.	Average yield per acre, bushels.	Total yield per county, bushels.
Carroll	17,995	14	251,930	7,173	30	215,190
Carter	1,232	11	13,552	540	25	13,500
Cass	16,559	14	231,826	17,275	34	587,350
Cedar	5,445	10	54,450	7,770	28	217,560
Chariton	17,553	11	193,083	5,104	35	178,640
Christian	14,879	12	178,548	5,200	38	197,600
Clark	7,330	13	95,290	34,487	30	1,034,610
Clay	5,370	16	85,920	2,259	37	83,583
Clinton	2,153	15	32,295	5,078	37	187,886
Cole	28,407	12	340,884	4,497	38	170,886
Cooper	36,270	10	362,700	8,239	38	303,082
Crawford	12,048	9	108,432	1,847	32	59,104
Dade	14,448	12	173,376	8,540	36	307,440
Dallas	6,728	12	80,736	5,633	34	191,522
Daviess	4,827	14	67,578	3,642	37	134,754
DeKalb	1,981	13	25,753	3,081	30	92,430
Dent	10,721	9	96,489	1,665	25	41,625
Douglas	14,357	11	157,927	3,025	25	75,625
Dunklin	3,264	16	52,224	808	33	26,664
Franklin	69,438	14	972,132	5,985	33	197,505
Gasconade	23,546	13	306,098	4,119	37	152,403
Gentry	1,795	16	28,720	5,951	30	178,530
Greene	24,406	13	317,278	13,434	37	497,058
Grundy	3,008	18	54,144	2,886	34	98,124
Harrison	2,459	16	39,344	10,514	31	325,934
Henry	21,317	15	319,755	19,944	30	598,320
Hickory	4,544	10	45,440	4,223	31	130,913
Holt	4,179	17	71,043	16,312	32	521,984
Howard	27,975	10	279,750	1,914	30	57,420
Howell	11,127	13	144,651	2,588	28	72,464
Iron	1,808	16	28,928	1,050	35	36,750
Jackson	19,736	15	296,040	6,490	35	227,150
Jasper	44,834	18	807,012	14,774	43	635,282
Jefferson	18,702	16	299,232	2,061	40	82,440
Johnson	29,367	11	322,037	8,872	32	283,904
Knox	1,065	12	12,780	51,780	35	1,812,300
Laclede	4,061	9	36,549	3,958	33	130,614
Lafayette	37,790	12	453,480	11,849	31	367,319
Lawrence	46,194	13	600,522	12,258	38	465,804
Lewis	3,956	14	55,384	6,015	35	210,525
Lincoln	38,847	11	427,317	11,653	37	431,161
Linn	2,377	17	40,409	3,987	36	143,532
Livingston	5,909	14	82,726	4,100	37	151,700
McDonald	12,378	16	198,048	1,831	38	69,578
Macon	5,006	16	81,056	4,415	40	176,480
Madison	4,240	16	67,840	1,019	33	33,627
Maries	12,290	9	110,610	2,249	30	72,870
Marion	13,409	11	147,499	2,772	38	105,336

WHEAT AND OATS—Continued.

County.	Wheat.			Oats.		
	Acreage.	Average yield per acre, bushels.	Total yield per county, bushels.	Acres.	Average yield per acre, bushels.	Total yield per county, bushels.
Mercer	2,246	17	38,182	4,683	34	159,222
Miller	10,931	9	98,379	3,921	33	129,393
Mississippi	28,466	18	512,388	148	28	4,144
Moniteau	16,967	10	169,670	5,709	36	212,724
Monroe	7,248	14	101,472	11,413	28	319,564
Montgomery	20,170	10	201,700	15,044	30	451,320
Morgan	9,258	10	92,580	5,015	32	160,480
New Madrid	10,870	23	250,010	308	28	8,624
Newton	30,007	15	450,105	6,040	36	217,440
Nodaway	3,675	15	55,125	18,936	30	568,080
Oregon	7,855	11	86,405	1,539	25	38,475
Osage	17,474	10	174,740	2,033	35	71,155
Ozark	7,441	9	66,969	1,391	27	37,557
Pemiscot	5,102	25	127,550	68	32	2,176
Perry	39,419	11	433,609	4,240	33	139,920
Pettis	22,748	10	227,480	6,028	31	186,868
Phelps	9,662	10	96,620	3,602	27	102,654
Pike	40,946	11	450,406	13,488	30	404,640
Platte	30,880	22	679,360	2,368	42	99,456
Polk	14,694	10	146,940	10,692	35	374,220
Pulaski	8,302	10	83,020	2,522	31	78,182
Putnam	1,660	17	28,220	7,244	36	260,784
Ralls	9,320	9	83,880	6,772	33	223,476
Randolph	3,502	10	35,020	3,814	29	110,606
Ray	8,775	14	122,850	2,962	34	100,708
Reynolds	1,963	11	21,593	710	25	1,775
Ripley	5,310	15	79,650	4,146	31	129,022
St. Charles	55,643	14	779,002	8,162	35	285,670
St. Clair	5,722	10	57,220	7,749	28	216,972
Ste. Genevieve	20,583	16	329,328	917	40	36,680
St. Francois	9,303	14	130,242	1,149	27	31,023
St. Louis	49,275	14	689,850	2,446	35	85,610
Saline	33,878	10	338,780	8,545	36	307,620
Schuyler	2,452	14	34,328	6,098	35	213,430
Scotland	1,093	18	19,674	12,057	37	446,109
Scott	49,279	15	739,185	220	33	7,260
Shannon	3,029	11	33,319	864	25	21,600
Shelby	11,762	11	129,382	8,475	40	339,000
Stoddard	23,272	16	372,352	2,279	35	79,765
Stone	6,674	15	100,110	1,511	35	52,885
Sullivan	572	17	9,724	2,994	35	104,790
Taney	5,291	13	68,783	1,758	34	59,772
Texas	14,916	13	193,908	3,551	27	95,877
Vernon	6,356	15	95,340	13,059	30	391,770
Warren	21,276	12	255,312	6,987	35	244,545
Washington	9,567	14	133,938	1,838	32	58,816
Wayne	4,978	14	69,692	1,197	25	29,925
Webster	12,920	13	167,960	5,361	33	176,913
Worth	1,150	15	17,250	3,544	33	116,952
Wright	12,142	12	145,704	2,835	29	82,115

SUMMARY OF THE ACREAGE, YIELD AND VALUE OF FARM CROPS FOR THE YEAR 1910 FOR THE STATE AND BY SECTIONS.

CORN.

Section.	Acres planted.	Average yield per acre, bu.	Total yield, bushels.	Total value.
Northeast	1,535,921	38.8	59,621,670	$23,267,768
Northwest	2,469.439	32.2	79,413,086	34,359,779
Central	1,223,801	31.5	38,585,049	17,032,713
Southwest	1,653,335	27	45,414,628	19,462,985
Southeast	913,290	32	29,437,667	13,796,199
State	7,795,786	32.4	252,472,100	$107,919,354

WHEAT.

Section.	Acres sown.	Acres harvested.	Average yield per acre, bushels.	Total yield bushels.	Total value.
Northeast	288,832	246,864	12	3,012,139	$2,576,775
Northwest	243,055	190,163	16	3,065,852	2,698,013
Central	432,091	332,056	10	3,420,399	2,924,468
Southwest	421,104	400,823	14	5,508,192	4,743,215
Southeast	538,805	496,904	14	6,995,308	6,227,672
State	1,923,887	1,666,810	13.2	22,001,890	$19,170,143

WHEAT SOWN, FALL 1910.

Section.	Acreage sown, 1910.	Acreage compared with previous year per cent.	Average condition, crop Dec. 1, 1910.	Previous five-year average con. Dec. 1, 1910.
Northeast	273,590	94.7	78	86.5
Northwest	240,774	99.	79	86.2
Central	409,733	94.8	75	86.8
Southwest	426,179	101.2	77	86.9
Southeast	530,731	98.5	72	84
State	1,881,007	97.6	76.2	85.9

OATS.

Section.	Acres harvested.	Average yield per acre, bu.	Total yield, bushels.	Total value.
Northeast	243,331	33.3	8,080,199	$2,263,388
Northwest	149,095	33.1	4,930,774	1,515,703
Central	108,480	33.2	3,596,365	1,130,873
Southwest	196,215	33.7	6,607,997	2,016,836
Southeast	58,633	31.7	1,855,780	678,385
State	755,754	33.2	25,071,115	$7,605,185

TAME HAY AND FORAGE.

Section.	Acres harvested.	Average yield per acre, tons.	Total yield, tons.	Total value.
Northeast	1,071,108	1.4	1,484,206	$12,463,334
Northwest	896,090	1.5	1,320,395	10,907,441
Central	581,713	1.4	814,308	7,208,313
Southwest	600,193	1.3	797,097	6,836,388
Southeast	336,399	1.4	470,005	5,492,508
State	3,485,503	1.4	4,886,011	$42,907,984

PRAIRIE HAY.

Section.	Acres harvested.	Average yield per acre, tons.	Total yield, tons.	Total value.
Northeast	16,375	1.4	22,925	$149,011
Northwest	33,848	1.6	54,157	379,098
Central	13,326	1.2	15,991	127,933
Southwest	90,707	1.2	108,849	816,371
Southeast	2,147	1.3	2,791	22,325
State	156,403	1.34	204,713	$1,494,740

SUMMARY OF TOTAL YIELD AND VALUE OF FARM CROPS PRODUCED BY MISSOURI FARMERS IN THE YEAR 1910.

	Acreage.	Yield.	Value.
Corn	7,795,786	252,472,100	$107,919,354
Wheat	1,666,810	22,001,890	19,170,143
Oats	755,754	25,071,115	7,605,185
Tame hay and forage	3,485,503	4,886,011	42,907,984
Prairie	156,403	204,713	1,494,740
Flax	13,900	108,420	216,840
Rye	9,282	131,804	105,443
Buckwheat	1,590	29,579	28,000
Barley	1,215	28,200	17,202
Broomcorn	3,876	2,124,048	101,954
Cotton	75,886	31,872,120	4,143,376
Potatoes	70,774	5,874,242	3,935,742
Tobacco	7,242	6,706,092	851,674
Sorgum seed	22,037	449,440	446,743
Sorghum syrup	22,037	1,971,600	985,800
Clover seed	30,228	54,410	421,681
Timothy seed	32,364	113,274	424,800
Kaffir corn, millet, cowpeas, castor beans, etc			1,270,000
Miscellaneous vegetables			7,500.000
Total value of all crops			$199,546,661

CROP YIELD, 1910.

Average Per Acre by Crop Sections.

Crop.		N. E. Sec. 20 counties.	N. W. Sec. 21 counties.	Cent. Sec. 21 counties.	S. W. Sec. 23 counties.	S. E. Sec. 29 counties.	Whole 114 counties.
Corn, bushels		38.8	32.2	31.5	27	32	32.4
Wheat, bushels		21	16	10	14	14	13.2
Oats, bushels		33.3	33.1	33.2	33.7	31.7	33.2
Hay	Timothy, tons	1.3	1.4	1.4	1.4	1.4	1.38
	Prairie, tons	1.4	1.6	1.2	1.2	1.3	1.34
	Clover, tons	1.6	1.6	1.5	1.5	1.5	1.54
	Alfalfa, tons	2.8	2.8	2.9	1.2	2.8	2.5
	Cowpea, tons	1.8	2	2	1.7	1.9	1.9
Flax, bushels							7.8
Rye, bushels		14	15	13	16	13	14.2
Buckwheat, bushels		19	25	22	15	12	18.6
Barley, bushels		20	24	20	27	27	23.2
Broomcorn, pounds		593	500	740	325	582	548
Cotton (lint), pounds							420
Potatoes		88	77	71	80	97	83
Tobacco, pounds		1082	1325	875	575	791	926
Sorghum syrup, gallons		88	98	89	92	98	93
Sorghum seed, bushels		23	17	20	29	17	21.2
Kaffir corn, bushels		23	20	28	25	22	23.6
Cowpeas, bushels		11	13	10	12	11	11.4
Clover seed, bushels		1.8	1.9	1.6	1.9	1.7	1.8
Timothy seed, bushels		3.7	3.4	3.7	3.1	3.5	3.48

AVERAGE FARM PRICE DECEMBER 1, 1910.

The prices given in this table are governed by local conditions and are the current local prices prevailing in the country.

	N. E.	N. W.	Central.	S. W.	S. E.	State.
Corn, per bushel	$ .39	$ .43	$ .44	$ .43	$ .47	$.427
Wheat, per bushel	.86	.88	.86	.86	.89	.871
Oats, per bushel	.28	.31	.31	.31	.36	.31
Flax, per bushel	....	....	....	....	....	2.00
Timothy seed, per bushel	3.50	3.50	4.25	3.75	3.50	3.75
Clover seed, per bushel	7.50	7.50	8.00	8.50	7.50	7.75
Cowpea seed, per bushel	2.00	1.85	1.80	2.00	1.50	1.83
Sorgum seed, per bushel	1.10	.96	.97	.97	.97	.99
Kaffir corn, per bushel	.80	.80	.80	.75	.85	.80
Rye, per bushel	.72	.75	.78	.91	.84	.80
Buckwheat, per bushel	.86	1.13	.78	....	1.04	.95
Barley, per bushel	.55	.54	.71	....	.62	.61
Potatoes, per bushel	.70	.75	.70	.65	.55	.67
Sweet potatoes, per bushel	1.05	1.25	.90	.75	.70	.93
Winter apples, per bushel	1.12	.84	1.10	.75	1.05	.97
Timothy hay, per ton	9.00	8.50	9.25	9.25	12.25	9.65
Clover hay, per ton	8.00	7.75	9.00	8.50	11 25	8.90
Alfalfa hay, per ton	11.25	10.50	10.50	10.75	13.25	11.25
Cowpea hay, per ton	8.00	6.25	7.50	8.50	10.75	8,20
Prairie hay, per ton	6.50	7.00	8.00	7.50	8.00	7.60
Broomcorn brush, per ton	103.00	92.50	80.00	108 00	97.50	96.00
Cotton lint, per pound	....	....	....	....	....	13.00
Leaf tobacco, per pound	.11	.14	.135	.12	.13	.127
Wool, per pound	.21	.20	.21	.22	.23	.214

LIVE STOCK—AVERAGE FARM PRICE PER HEAD DECEMBER 1, 1910.

	N. E. Sec.	N. W. Sec.	Cent. Sec.	S. W. Sec.	S. E. Sec.	State.
Horses.						
Spring colts	$62.	$57.	$57.	$57.	$56.	$58.
Yearlings	87.	84.	82.	83.	78.	83.
Two years and over	123.	118.	114.	117.	112.	117.
Cattle.						
Steer calves	17.75	16.50	16.	13.	11.50	15.
Heifer calves	14.75	13.75	13.75	11.25	10.50	12.75
Yearling steers	26.75	26.50	24.	20.50	17.75	23.
Yearling heifers	22.75	22.	20.25	18.25	16.50	20.
Steers, 2 years and over	39.25	38.25	34.75	31.25	27.75	34.25
Cows, 2 years and over	43.	47.25	42.50	40.50	39.	42.50
Sheep.						
Lambs under 1 year	3.75	3.75	3.75	3.50	3.25	3.60
All other sheep	4.50	4.75	4.25	4.25	4.	4.35

FARM PRODUCE—PRICE PER POUND, DOZEN, ETC.

	N. E. Sec.	N. W. Sec.	Cent. Sec.	S. W. Sec.	S. E. Sec.	State.
Chickens.						
Average price per pound...	$.09	$.09	$.09	$.085	$.09	$.089
Turkeys.						
Average price per pound...	.15	.15	.15	.145	.15	.149
Number as compared with average year.........	.81	.81	.94	.84	.84	.85
Eggs and Butter.						
Eggs, per dozen..........	.25	.25	.24	.25	.24	.246
Butter, per pound........	.24	.25	.22	.23	.23	.231
Honey.						
Price per pound, comb....	.13	.14	.15	.17	.15	.15
Price per pound, extracted.	.11	.13	.13	.15	.14	.13

LIVE STOCK—CONDITION AS TO THRIFT AND HEALTH DEC. 1, 1910.

	N. E. Sec.	N. W. Sec.	Cent. Sec.	S. W. Sec.	S. E. Sec.	State.
Horses..................	96	96	95	97	98	96
Mules....................	97	97	97	99	99	98
Hogs.....................	95	92	93	97	94	94
Sheep....................	97	94	94	97	95	93
Cattle...................	98	97	97	97	95	97

LIVE STOCK—NUMBER AS COMPARED WITH AVERAGE YEAR.

	N. E. Sec.	N. W. Sec.	Cent. Sec.	S. W. Sec.	S. E. Sec.	State.
Hogs.....................	81	75	78	73	76	77
Sheep....................	94	92	88	91	83	90
Cattle...................	87	82	86	85	85	85

MISSOURI LIVE STOCK.

An abstract of the assessment of horses and mules as shown by the assessors' returns June 1, 1910. (Compiled from reports of State Auditor John P. Gordon.)

County.	Horses.			Mules.		
	No.	Value.	Average.	No.	Value.	Average.
Adair	9,767	$292,795	$40.22	1,309	$56,480	$43.15
Andrew	9,276	358,665	38.66	2,452	138,120	56.33
Atchison	8,688	324,120	37.30	3,159	126,760	40.13
Audrain	9,925	406,350	40.94	5,050	270,640	53.59
Barry	9,132	367,802	40.28	2,422	103,715	42.40
Barton	9,061	340,187	37.54	2,842	119,786	42.15
Bates	15,826	561,938	35.82	4,291	186,637	43.48
Benton	7,571	243,870	32.08	2,505	95,590	38.16
Bollinger	5,167	250,370	48.45	2,500	137,415	54.96
Boone	9,515	369,055	38.78	5,938	254,245	42.81
Buchanan	8,985	331,960	36.95	3,068	139,225	45.38
Butler	3,416	136,015	39.81	1,659	69,175	41.77
Caldwell	8,352	304,332	36.43	2,072	100,420	48.46
Callaway	9,898	310,645	31.38	5,457	234,405	42.95
Camden	4,950	254,981	51.51	1,610	105,605	65.59
Cape Girardeau	5,377	270,545	50.20	2,537	137,410	54.16
Carroll	11,809	420,560	35.61	5,126	203,485	39.69
Carter	1,068	61,995	58.04	583	40,195	68.94
Cass	14,099	520,906	36.95	3,747	152,350	40.65
Cedar	7,965	294,382	36.96	2,425	99,715	41.12
Chariton	11,488	458,979	39.95	3,569	180,720	50.63
Christian	7,449	279,216	37.48	1,961	83,659	42.66
Clark	7,925	288,155	36.36	954	40,385	42.33
Clay	7,598	294,590	38.77	2,036	95,955	47.13
Clinton	6,051	202,580	33.47	2,139	108,815	50.87
Cole	3,574	128,190	35.86	1,411	72,690	51.51
Cooper	7,242	349,935	48.32	4,972	295,760	59.48
Crawford	3,894	150,530	38.65	1,688	76,645	45.40
Dade	7,473	213,961	28.63	3,479	87,242	35.15
Dallas	6,200	210,392	33.93	1,953	65,735	33.73
Daviess	12,032	438,466	36.44	3,177	127,060	39.99
DeKalb	8,491	297,915	35.08	2,306	88,710	38.47
Dent	4,779	196,926	41.18	1,903	81,641	42.90
Douglas	6,899	294,860	42.73	1,457	63,258	43.41
Dunklin	4,634	221,850	47.80	4,860	282,620	51.90
Franklin	7,305	286,770	39.25	3,291	154,125	43.79
Gasconade	3,738	150,815	42.21	2,137	96,120	44.97
Gentry	11,296	401,469	35.54	2,104	71,990	34.21
Greene	14,703	569,578	38.74	2,831	188,825	66.70
Grundy	8,840	292,744	33.11	1,929	64,930	33.65
Harrison	16,666	534,285	32.05	3,326	74,842	31.74
Henry	11,495	422,010	36.71	4,147	172,273	41.54
Hickory	6,114	257,965	42.20	1,682	82,943	49.31
Holt	6,696	318,760	47.58	2,286	131,240	57.41

MISSOURI LIVE STOCK—Continued.

County.	Horses.			Mules.		
	No.	Value.	Average.	No.	Value.	Average.
Howard	6,293	$273,520	$43.46	3,944	$219,890	$55.75
Howell	7,032	301,166	42.82	2,265	106,156	46.86
Iron	1,936	106,919	55.23	876	35,850	40.92
Jackson	21,799	967,548	44.38	4,289	267,003	62.22
Jasper	15,566	558,007	35.85	2,564	113,960	44.40
Jefferson	5,961	205,910	34.54	2,530	101,960	40.30
Johnson	14,070	568,460	40.40	5,769	241,100	41.79
Knox	8,930	431,135	48.28	1,771	79,295	44.77
Laclede	6,862	295,695	43.23	1,896	93,150	49.12
Lafayette	12,229	446,235	36.34	5,604	265,665	47.40
Lawrence	9,953	369,435	37.11	2,884	121,620	42.17
Lewis	7,738	292,270	37.74	1,737	59,115	34.03
Lincoln	8,451	352,595	41.72	2,527	101,310	40.09
Linn	11,619	388,508	33.44	2,471	78,559	31.79
Livingston	10,467	364,888	34.86	2,055	81,106	39.46
McDonald	4,698	258,760	55.07	1,398	70,365	50.33
Macon	12,749	505,065	40.40	3,399	136,570	40.17
Madison	2,440	118,335	44.40	1,268	69,835	55.00
Maries	3,865	151,510	39.00	1,866	78,545	42.00
Marion	7,811	311,055	39.82	1,556	80,745	51.89
Mercer	9,502	328,795	34.60	1,403	43,975	31.35
Miller	6,578	237,615	36.12	2,430	104,285	42.91
Mississippi	2,803	105,165	37.51	4,778	235,495	49.28
Moniteau	6,227	245,790	39.47	3,019	142,025	47.04
Monroe	10,339	408,440	39.50	4,797	209,020	43.57
Montgomery	6,140	236,275	38.40	3,214	148,580	46.22
Morgan	5,983	188,115	31.44	2,869	121,830	42.49
New Madrid	2,655	97,860	36.86	4,850	210,000	43.30
Newton	10,270	289,855	28.22	1,733	50,455	29.11
Nodaway	16,921	611,605	36.14	2,809	116,330	41.41
Oregon	4,247	140,980	32.93	1,889	66,530	35.21
Osage	4,107	152,370	37.10	2,580	130,130	38.18
Ozark	5,174	260,476	50.34	1,572	91,128	57.96
Pemiscot	2,237	95,579	42.72	3,556	182,005	50.62
Perry	4,915	154,544	31.44	2,729	99,943	36.62
Pettis	11,946	454,855	38.07	5,040	254,960	50.58
Phelps	4,593	163,603	35.62	1,443	61,539	42.64
Pike	7,434	314,400	42.29	3,035	141,520	46.62
Platte	6,126	261,710	42.72	2,599	157,720	60.68
Polk	11,836	478,929	40.46	5,517	197,090	32.46
Pulaski	4,497	186,370	41.44	1,271	60,675	47.74
Putnam	10,897	369,980	33.95	1,492	48,208	32.31
Ralls	5,495	245,375	44.67	1,713	77,075	45.00
Randolph	7,791	344,574	44.22	2,484	114,430	46.17
Ray	10,078	350,580	34.78	4,291	188,850	44.01
Reynolds	2,609	132,845	50.92	1,423	94,825	66.64
Ripley	3,360	209,785	57.44	1,503	96,615	64.28
St. Charles	7,508	368,275	49.05	2,975	187,410	62.99

MISSOURI LIVE STOCK—Continued.

County.	Horses.			Mules.		
	No.	Value.	Average.	No.	Value.	Average.
St. Clair	9,714	$376,550	$38.76	2,315	$112,625	$48.65
St. Francois	3,892	162,045	41.65	1,460	83,605	57.05
Ste. Genevieve	3,096	113,275	36.59	1,185	57,075	48.16
St. Louis	10,409	488,460	43.08	3,840	229,390	59.73
Saline	11,317	460,629	40.70	7,207	359,168	49.83
Schuyler	6,619	251,575	38.01	838	30,780	36.73
Scotland	9,201	365,160	39.68	1,194	47,245	39.56
Scott	4,040	164,465	40.70	5,239	238,654	45.55
Shannon	3,414	186,817	54.72	1,518	84,105	55.40
Shelby	9,505	343,455	36.13	3,720	127,390	34.51
Stoddard	7,680	347,411	45.66	4,549	241,406	53.06
Stone	4,432	173,030	39.05	1,327	59,655	44.95
Sullivan	12,747	393,051	30.08	2,538	77,611	30.57
Taney	4,112	209,504	50.94	1,067	65,760	61.62
Texas	8,637	305,451	35.36	2,537	108,365	42.70
Vernon	14,299	468,416	32.76	3,983	149,922	37.64
Warren	2,517	122,950	48.84	1,297	68,970	53.17
Washington	3,573	132,385	37.05	1,759	80,565	45.85
Wayne	3,494	146,330	41.88	2,107	105,210	49.93
Webster	7,221	305,505	42.50	2,329	108,375	46.50
Worth	6,878	306,820	44.60	691	36,805	53.26
Wright	7,908	313,253	39.61	2,101	86,747	41.28
St. Louis city	10,778	531,860	49.34	1,171	64,010	54.82
State	900,649	$34,816,317	$37.54	309,003	$13,833,594	$44.77

An abstract of the assessment of asses and jennets and neat cattle as shown by the assessors' returns June 1, 1910. (Compiled from reports of State Auditor John P. Gordon.)

County.	Asses, jennets.			Neat cattle.		
	No.	Value.	Average.	No.	Value.	Average.
Adair	57	$3,585	$62.90	21,388	$256,035	$11.04
Andrew	135	8,370	62.00	22,866	366,565	16.03
Atchison	38	3,700	97.37	27,480	468,810	17.06
Audrain	176	11,125	63.21	18,843	282,925	15.01
Barry	182	90,025	49.46	17,179	103,715	6.00
Barton	82	4,300	52.44	17,509	178,207	10.18
Bates	215	12,322	57.31	27,453	313,485	11.53
Benton	126	6,960	55.24	18,489	215,035	11.63
Bollinger	73	5,770	79.00	14,597	145,728	9.98
Boone	239	10,865	45.46	18,196	269,105	14.78
Buchanan	111	5,800	52.25	14,125	243,055	17.21
Butler	38	1,120	29.47	11,963	91,040	7.61
Caldwell	72	5,620	78.05	19,987	250,569	13.03
Callaway	340	21,820	64.17	15,502	209,785	13.53
Camden	46	4,020	87.39	15,801	247,370	15.65
Cape Girardeau	85	8,505	100.00	11,529	116,480	10.00

MISSOURI LIVE STOCK—Continued.

County.	Asses, jennets.			Neat cattle.		
	No.	Value.	Average.	No.	Value.	Average.
Carroll	159	$7,560	$47.54	20,769	$247,073	$11.88
Carter	12	840	70.00	5,830	66,499	11.74
Cass	163	11,635	71.38	25,073	297,758	11.87
Cedar	73	6,570	90.00	16,598	197,647	11.91
Chariton	111	12,165	118.69	20,134	295,883	14.69
Christian	134	6,975	52.05	17,102	181,971	10.64
Clark	37	2,540	68.64	15,449	191,040	12.36
Clay	54	10,500	194.44	17,353	285,795	16.47
Clinton	42	3,170	75.47	22,885	359,375	15.70
Cole	75	3,975	53.00	9,988	103,025	10.31
Cooper	133	12,370	93.00	16,739	278,860	16.65
Crawford	55	2,350	42.72	11,480	139,530	12.14
Dade	147	5,528	37.60	16,112	153,475	9.52
Dallas	76	4,690	61.71	15,003	134,373	8.95
Daviess	117	12,610	107.77	22,950	286,540	12.48
DeKalb	44	3,905	88.75	22,373	284,545	12.72
Dent	112	5,005	45.13	14,560	160,393	11.01
Douglas	75	4,380	58.40	16,105	202,333	12.56
Dunklin	23	1,045	45.40	14,806	134,952	9.10
Franklin	62	4,160	67.09	13,307	197,515	14.85
Gasconade	38	2,765	72.76	9,450	89,600	9.48
Gentry	115	6,240	54.26	25,085	354,009	14.11
Greene	123	7,574	61.58	24,899	307,609	12.35
Grundy	127	7,250	57.08	18,158	237,135	13.05
Harrison	86	8,420	97.90	34,439	469,931	13.64
Henry	364	6,345	17.43	24,593	262,270	10.66
Hickory	92	6,325	68.75	14,690	169,891	11.57
Holt	41	3,390	82.68	15,261	249,330	16.33
Howard	154	14,290	92.79	13,984	233,315	16.68
Howell	119	8,450	71.00	16,082	189,621	11.79
Iron	33	1,890	57.27	5,949	64,024	10.76
Jackson	......	....	....	22,754	426,088	18.22
Jasper	93	5,665	60.90	20,413	236,976	11.00
Jefferson	57	2,870	50.40	14,093	146,752	10.41
Johnson	250	16,155	64.62	32,470	441,665	13.60
Knox	95	4,985	52.47	17,697	243,485	13.76
Laclede	95	5,145	54.15	16,905	231,920	13.71
Lafayette	116	8,885	76.59	24,791	359,445	14.49
Lawrence	130	7,520	57.84	18,083	208,890	11.55
Lewis	48	5,280	110.00	15,428	224,530	14.55
Lincoln	93	6,225	66.93	13,550	178,238	13.50
Linn	104	6,855	65.91	31,597	393,749	12.45
Livingston	95	4,580	48.21	19,663	219,838	11.18
McDonald	107	4,705	43.97	11,076	116,870	10.55
Macon	120	10,270	93.92	26,911	381,185	14.16
Madison	25	1,725	43.00	7,780	87,910	11.30
Maries	47	2,620	55.00	10,314	109,365	10.00
Marion	72	10,455	145.20	11,288	164,170	14.54

MISSOURI LIVE STOCK—Continued.

County.	Asses, jennets.			Neat cattle.		
	No.	Value.	Average.	No.	Value.	Average.
Mercer	65	$4,160	$64.00	21,519	$346,940	$16.12
Miller	56	4,625	82.59	15,787	162,180	10.27
Mississippi	40	1,940	48.50	6,794	73,150	10.76
Moniteau	122	9,840	80.65	11,982	160,321	13.38
Monroe	251	21,610	86.09	17,704	286,390	16.17
Montgomery	105	7,735	73.66	12,430	154,000	12.38
Morgan	113	4,800	42.47	13,292	121,000	9.10
New Madrid	13	725	55.77	10,154	52,205	5.14
Newton	98	4,245	43.31	14,399	139,135	9.66
Nodaway	75	4,695	62.60	47,292	551,470	11.66
Oregon	29	2,125	71.20	15,905	136,023	8.55
Osage	69	3,955	57.31	12,055	125,742	10.43
Ozark	78	5,690	71.67	20,081	239,797	11.94
Pemiscot	17	785	46.17	9,442	53,067	5.61
Perry	54	2,105	38.98	8,493	82,258	9.71
Pettis	138	8,810	67.25	24,626	385,100	15.22
Phelps	57	2,300	40.35	13,647	161,650	11.84
Pike	263	12,160	42.43	12,098	168,890	13.96
Platte	85	7,390	86.94	9,677	166,540	17.21
Polk	207	14,520	70.82	22,427	263,549	11.75
Pulaski	48	2,260	47.09	11,963	139,310	11.64
Putnam	55	2,545	46.27	27,266	349,148	12.80
Ralls	121	8,475	70.00	9,229	138,470	15.00
Randolph	176	12,970	72.98	13,874	237,040	17.20
Ray	180	17,690	98.27	17,390	301,535	17.33
Reynolds	24	1,595	66.46	13,234	138,660	10.48
Ripley	45	2,385	53.00	11,750	120,210	10.23
St. Charles	58	3,870	66.72	11,493	184,360	16.04
St. Clair	107	6,105	57.05	19,877	257,715	12.98
St. Francois	39	1,640	42.05	8,528	117,189	13.74
Ste. Genevieve	48	3,620	75.41	7,777	81,410	10.49
St. Louis	....	....	....	9,682	180,360	18.62
Saline	174	9,385	53.93	34,268	601,835	17.56
Schuyler	29	1,535	52.93	13,090	155,168	11.86
Scotland	74	3,075	41.55	20,527	248,465	12.10
Scott	24	1,415	59.00	9,024	80,924	8.97
Shannon	86	3,275	38.08	14,254	173,544	12.15
Shelby	177	13,025	73.58	15,262	216,955	14.22
Stoddard	57	3,860	67.71	17,595	154,738	8.79
Stone	88	4,265	48.46	11,334	116,970	10.32
Sullivan	137	6,380	46.57	31,647	440,860	13.93
Taney	98	4,653	46.45	14,557	224,893	15.44
Texas	209	9,832	47.04	24,914	248,752	9.98
Vernon	183	8,290	45.30	29,952	319,337	10.66
Warren	17	1,325	101.90	6,711	88,075	13.12
Washington	51	3,165	62.05	12,132	117,005	9.64
Wayne	41	1,690	41.21	15,389	138,725	8.96
Webster	144	7,985	55.46	18,041	209,910	11.60
Worth	106	5,565	52.50	13,936	243,076	17.44
Wright	125	6,365	50.92	20,374	212,282	11.74
St. Louis city	....	....	....	2,525	48,820	19.33
State	11,207	$785,214	$70.06	1,955,329	$24,879,339	$12.21

MISSOURI LIVE STOCK—Continued.

An abstract of the assessment of sheep and hogs as shown by the assessors' returns June 1, 1910. (Compiled from reports of State Auditor John P. Gordon.)

County.	Sheep.			Hogs.		
	No.	Value.	Average.	No.	Value.	Average.
Adair	11,357	$21,965	$1.93	8,062	$31,065	$3.85
Andrew	6,691	18,815	2.81	24,323	147,490	6.06
Atchison	1,746	3,470	1.99	34,662	99,105	2.86
Audrain	15,440	29,390	1.90	24,495	110,485	4.51
Barry	9,564	15,605	1.63	13,980	34,641	2.40
Barton	3,453	4,925	1.43	12,478	38,179	3.06
Bates	10,243	21,027	2.06	28,929	108,432	3.77
Benton	16,966	13,590	1.95	13,835	41,720	3.08
Bollinger	11,489	20,615	1.79	21,397	48,561	2.27
Boone	10,874	27,615	2.53	22,842	66,075	2.89
Buchanan	3,571	7,190	2.01	16,789	53,000	3.16
Butler	1,252	1,365	1.09	17,577	21,280	1.21
Caldwell	12,329	24,212	1.96	21,912	58,436	2.66
Callaway	19,269	37,220	1.93	19,855	73,105	3.68
Camden	16,211	32,052	1.97	13,540	33,639	2.48
Cape Girardeau	6,978	14,230	2.00	21,490	62,865	2.90
Carroll	8,543	13,174	1.54	25,524	74,563	2.92
Carter	826	1,312	1.58	6,448	11,485	1.78
Cass	10,735	20,490	1.90	35,475	118,277	3,33
Cedar	8,569	13,969	1.65	16,771	41,915	2.50
Chariton	16,416	38,285	2.33	16,804	66,982	3.98
Christian	12,326	17,566	1.42	20,790	39,359	1.41
Clark	11,705	33,450	2.00	6,086	30,440	5.00
Clay	9,530	22,605	2.37	22,920	92,160	4.02
Clinton	3,454	5,895	1.70	21,132	57,899	2.73
Cole	1,814	1,960	1.08	9,367	19,145	2.04
Cooper	8,780	15,845	2.01	35,986	131,457	3.65
Crawford	6,463	13,035	2.01	10,290	26,335	2.55
Dade	9,155	11,750	1.28	17,143	48,144	2.80
Dallas	7,894	12,586	1.59	13,002	25,382	1.85
Daviess	19,813	41,818	2.11	26,345	76,322	2.55
DeKalb	7,195	14,855	2.07	21,738	86,261	3.97
Dent	8,079	8,153	1.00	15,760	16,123	1.02
Douglas	16,593	33,024	1.99	15,376	37,312	2.42
Dunklin	418	167	.39	27,735	52,977	1.91
Franklin	4,355	10,155	2.33	18,166	55,190	3.03
Gasconade	3,052	6,435	2.10	10,316	31,853	3.08
Gentry	14,449	23,211	1.60	20,967	68,660	3.28
Greene	11,982	19,818	1.65	20,959	74,766	3.56
Grundy	17,118	33,489	1.95	13,230	42,612	3.22
Harrison	22,004	62,884	2.85	23,093	86,120	3.72
Henry	4,617	7,411	1.60	25,180	86,403	3.43
Hickory	7,700	13,694	1.80	10,035	30,343	3.02
Holt	1,698	4,390	3.58	21,280	124,170	6.83

MISSOURI LIVE STOCK—Continued.

County.	Sheep.			Hogs.		
	No.	Value.	Average.	No.	Value.	Average.
Howard	8,353	$20,410	$2.44	23,226	$71,850	$3.09
Howell	9,792	12,323	1.25	23,663	31,836	1.34
Iron	1,743	2,327	1.35	5,280	12,348	2.33
Jackson	10,755	21,608	2.00	24,523	121,902	4.97
Jasper	4,856	10,605	2.19	16,467	50,603	3.68
Jefferson	3,174	4,098	1.29	14,167	38,463	2.72
Johnson	20,415	33,645	1.65	33,206	109,955	3.31
Knox	12,550	18,549	1.48	13,660	40,371	2.95
Laclede	12,298	25,260	2.05	13,915	41,040	2.94
Lafayette	8,247	16,480	1.99	29,933	126,975	4.25
Lawrence	6,980	14,230	2.04	18,579	55,245	2.97
Lewis	11,680	32,799	2.80	11,371	43,127	3.79
Lincoln	6,395	12,458	1.98	30,960	101,113	3.57
Linn	20,674	30,682	1.49	15,599	48,569	3.12
Livingston	12,632	22,787	1.80	18,913	69,447	3.67
McDonald	6,200	10,795	1.74	12,534	31,659	2.52
Macon	13,772	25,065	1.82	11,265	43,650	3.87
Madison	3,246	4,797	1.47	7,681	21,808	2.83
Maries	7,587	11,375	1.49	16,315	17,602	1.00
Marion	9,634	19,570	2.03	20,352	71,915	3.55
Mercer	12,046	45,620	3.78	621	730	1.17
Miller	7,666	10,740	1.40	17,976	31,860	1.76
Mississippi	228	260	1.14	17,580	46,950	2.67
Moniteau	3,903	8,475	2.17	15,234	52,879	3.47
Monroe	26,443	48,640	1.84	20,055	78,980	3.90
Montgomery	7,659	17,725	2.31	19,169	79,580	4.15
Morgan	6,472	10,650	1.14	11,529	27,400	2.37
New Madrid	410	410	1.00	19,840	20,140	1.01
Newton	2,027	3,355	1.65	10,935	24,065	2.20
Nodaway	6,248	6,251	1.00	40,456	155,496	3.84
Oregon	4,455	4,455	1.00	19,313	19,313	1.00
Osage	4,058	5,420	1.33	14,440	35,772	2.47
Ozark	5,758	11,257	1.95	13,762	23,081	1.67
Pemiscot	122	254	2.08	15,181	27,139	1.78
Perry	8,326	10,297	1.23	22,346	36,889	1.65
Pettis	9,492	21,030	2.21	25,641	90,635	3.53
Phelps	5,420	8,533	1.57	10,578	19,022	1.79
Pike	6,987	19,010	2.72	17,148	61,110	3.56
Platte	7,133	18,540	2.59	12,130	64,980	5.35
Polk	16,437	30,463	1.85	22,783	65,369	2.83
Pulaski	11,110	14,245	1.28	15,364	26,750	1.74
Putnam	12,696	16,423	1.29	8,899	30,653	3.44
Ralls	11,400	22,805	2.00	8,621	43,115	5.00
Randolph	13,098	26,935	2.20	8,571	42,210	4.90
Ray	7,176	17,540	2.44	25,613	94,485	3.68
Reynolds	2,857	4,433	1.55	14,255	27,529	1.93
Ripley	3,362	4,976	1.48	15,623	24,181	1.55
St. Charles	4,136	10,660	2.57	19,282	75,080	3.89

MISSOURI LIVE STOCK—Continued.

County.	Sheep.			Hogs.		
	No.	Value.	Average.	No.	Value.	Average.
St. Clair	7,448	$8,115	$1.08	16,447	$53,560	$3.25
St. Francois	2,150	3,953	1.84	6,945	21,379	3.05
Ste. Genevieve	4,009	6,713	1.67	11,237	28,124	2.50
St. Louis	903	2,210	2.44	11,531	51,610	4.47
Saline	6,120	12,075	1.97	37,573	151,865	4.03
Schuyler	42,937	63,872	1.49	5,558	17,120	3.08
Scotland	13,703	28,005	2.04	10,986	49,655	4.53
Scott	1,044	1,120	1.07	23,617	48,150	2.05
Shannon	2,980	4,090	1.39	16,401	23,143	1.41
Shelby	13,830	26,750	1.21	16,427	59,100	3.59
Stoddard	3,208	3,824	1.19	42,311	42,481	1.00
Stone	7,181	10,515	1.46	10,632	20,960	1.98
Sullivan	19,415	33,553	1.72	13,437	42,398	3.15
Taney	6,962	13,654	1.96	9,529	20,793	2.18
Texas	16,153	23,150	1.43	27,417	47,881	1.74
Vernon	5,254	7,991	1.52	22,736	77,321	3.40
Warren	3,090	5,130	1.66	8,922	25,235	2.82
Washington	3,059	3,575	1.16	9,327	11,715	1.25
Wayne	2,929	5,347	1.48	18,223	38,225	2.09
Webster	7,597	13,830	1.75	13,337	33,395	2.50
Worth	8,747	13,172	1.50	8,514	36,970	4.34
Wright	18,006	31,860	1.56	1,249	29,793	1.65
St. Louis city	1	10	10.00	14	70	5.00
State	1,007,424	$1,856,491	$1.84	2,013,902	$6,096,547	$3.02

ANNUAL REPORT OF DR. D. F. LUCKEY, STATE VETERINARIAN, FOR THE YEAR BEGINNING DECEMBER 17, 1909, AND ENDING DECEMBER 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
Jno. W. Glass	Fremont, Mo	Petition	June 18	Cattle	Suspected tuberculosis	Tuberculin test applied. No diseased animals found.
Citizens of Ironton	Ironton, Mo	Petition	August 17	Numerous cattle	Texas fever	Ordered all cattle kept off commons and advised use of arsenical solution.
Citizens of Ironton	Ironton, Mo	Return visit	August 23	Numerous cattle	Texas fever	Advised continuing use of arsenical solution.
A. J. McFadden	Oran, Mo	Telegram from owner	September 17	100 cattle	Worms	Advised gasoline and worm powder treatment.

NOTE—The above table shows only a small part of the work of the State Veterinarian during the year. Practically all of his time was taken up with office work and Farmers' Institutes. He took personal charge of the tick eradication work in Ripley county and was in the field for nearly 3 months.

ANNUAL REPORT OF DR. W. F. BERRY, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
W. J. Smith	Oronogo, Mo	Secretary Wilson	October 21	1 mule	Glanders	Died before call.

ANNUAL REPORT OF DR. HENRY BOETTNER, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
Phillip Kassel	Farrar P. O., Mo	Private practice	July 23	1 mule	Glanders	Quarantined.

ANNUAL REPORT OF DR. HORACE BRADLEY, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
J. D. Rose	Clinton, Mo	Wired by Sec. Wilson	August 11	1 steer	Texas fever	Killed, cattle removed and pasture quarantined.

ANNUAL REPORT OF DR. L. D. BROWN, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	Now called.	Date.	Kind of stock.	Disease.	How disposed of.
J. M. Potter	Beaman, Mo	Dr. D. F. Luckey	1909. Dec. 25	2 cows	Tuberculosis	1 quarantined, 1 slaughtered.
E. E. Lehman	Versailles, Mo	Application	1910. Jan. 15	1 cow	Tuberculosis	Quarantined.
J. R. Colbern	Warrensburg, Mo	Application	January 19	2 cows	Tuberculosis	Quarantined.
Wm. Cloepfil	Rockport, Mo	By owner	February 2	1 mule	Glanders	Quarantined and reported to county court.
E. H. Nortoni	New Cambria, Mo	Return visit	February 18	1 cow	Tuberculosis	Quarantined, to be disposed of according to law.
G. W. Piper	Hannibal, Mo	Application	February 22	Herd, 44 cattle	Tuberculosis	Advised isolation of affected animals and thorough cleaning and disinfecting of stables.
G. W. Piper	Hannibal, Mo	Application	March 26	7 cattle	Tuberculosis	Quarantined, to be disposed of according to law.
E. L. McCutcheon	Hannibal, Mo	Application	March 26	1 cow	Tuberculosis	Quarantined.
A. Taylor	Hannibal, Mo	Application	April 7	4 cows	Tuberculosis	Quarantined, to be disposed of according to law.
Mrs. M. D. Bates	Hannibal, Mo	Application	April 13	1 bull	Tuberculosis	Quarantined, to be disposed of according to law.
J. F. Mager	Hannibal, Mo	Application	April 27	14 cattle	Tuberculosis	Quarantined the two affected animals, to be disposed of according to law; advised thorough cleaning and disinfecting of stables.
G. W. Piper and E. L. McCutcheon	Hannibal, Mo	Return visit	May 6	3 cows	Tuberculosis	Quarantined; advised cleaning and disinfecting barns.
Jno. Moffitt	Lamar, Mo	Dr. Luckey	May 16	1 cow	Texas fever	Quarantined; advised close watch for any reinfection with ticks and the use of oils.
J. B. and W. R. Burchfield	Niangua, Mo	Letter from Dr. Luckey	June 6	Herd of 50 cattle	In doubt	Diagnosis not positive; advised abandonment of pasture until further development of the disease.
F. R. Brown	Houston, Mo	Dr. Luckey	June 6	Herd of 55 cattle	Forage poisoning	Five sick, two dead; advised change of pasture.
J. B. and Conley E. Drake	Joplin, Mo	Dr. Luckey	June 15	Herd of 49 cattle	Texas fever	Quarantined; advised arsenic dip and abandonment of pasture.
Dameron and Stage	Joplin, Mo	Found in tick eradication work	June 15	20 cattle	Texas fever	Found 8 infested; ordered under supervision of U. S. inspectors; quarantined herd.
Jno. Dombroski, A. Golulski and Lewis Diebold	Pierce City, Mo	Petition	Aug. 17	Cattle	Blackleg	Advised change of pasture, vaccination, burning and burying all dead animals and disinfecting ground where dead cattle lay.
W. P. Gresham	Jasper, Mo	Order of Dr. Luckey	October 4	Cattle	Texas fever	Quarantined; advised cleaning and greasing.
Jacob Bruffett	Carthage, Mo	Order of Dr. Luckey	October 4	Cattle	Texas fever	Quarantined; advised cleaning and greasing.
J. A. Galloway and Mr. Haygood	Cassville, Mo	Order of Dr. Luckey	October 25	Cattle	Texas fever	Cattle belonged to J. E. Bush and James Morton, quarantined; advised disinfecting cattle with oil.

ANNUAL REPORT OF DR. L. G. CLARK, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
A. J. Ackerman	Hume, Mo	Secretary Wilson	1910. August 14	1 cow	Unable to diagnose case.	General line of treatment.
A. J. Ackerman	Hume, Mo	Return visit	August 19	3 cows	Forage poisoning	Advised keeping up same treatment.
H. H. Grist et al	Athens, Mo	Secretary Wilson	November 18	1 mare	Suspected glanders	Dead and buried before my arrival.

NOTE—Dr. Brown is employed regularly in testing herds of cattle for tuberculosis and on Texas fever eradication work in south Missouri. Work shown in table page 481 was only incidental.

ANNUAL REPORT OF DR. JAS. CULLISON, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
Dr. A. J. Martin	East Prairie, Mo	Return visit	1909. December 28	1 mare	Chronic glanders	Quarantined; advised care and cleanliness.
Gideon Crews	Caruthersville, Mo	Petition	1910. January 25	1 mare	Heaves.	
A. H. Carter	Dexter, Mo	Dr. Luckey	March 28	1 jack	Urethritis	Advised not to use jack.
Tab Moore	New Madrid, Mo	By letter	October 1	Calves	Pneumonia	Advised separating all calves that looked bad from herd and the use of nuclein solution.
Tab Moore	New Madrid, Mo	Return visit	October 4	Calves	Pleuro-pneumonia	Advised keeping up of same treatment.
Biggs Bros	Wyatt, Mo	Dr. Luckey	November 4	Herd of 31 cattle	Fever ticks	Quarantined until properly treated.
C. C. Conyers	East Prairie, Mo	Private practice	November 28	1 mule	Acute glanders	Placed mule in quarantine.

ANNUAL REPORT OF DR. H. V. GOODE, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
Samuel Likes	St. Joseph, Mo	Brought by owner	1910. January 27	2 horses	Pyemia	Gave medicinal treatment.
Dr. Flanders	Cameron	Secretary Ellis	October 24	1 mule	Suppurative lymphangitis	Mule isolated and given medicinal treatment.

ANNUAL REPORT OF DR. A. J. HAMMERSTEIN, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
A. Widmer	St. Louis, Mo	By attending veterinarian	March 7	1 bay gelding	Glanders	Destruction and disinfection.
Henry Waldermeyer	St. Louis, Mo	By owner	March 21	1 bay gelding	Glanders	Destruction and disinfection.
S. J. Thorwegen	St. Louis, Mo	By attending veterinarian	March 27	1 mule	Glanders	Destruction and disinfection.
Henry Waldermeyer	St. Louis, Mo	By owner	April 8	1 mare and 1 gelding	Glanders and farcy	Destruction and disinfection.
Jacob Waffenschmitt	St. Louis, Mo	By attending veterinarian	April 16	1 bay gelding	Farcy	Destruction and disinfection.
Thos. Kelby	St. Louis, Mo	By owner	April 28	1 bay gelding	Pemphigus	Medicinal treatment.
Independent St. Louis Stock Yards Co	St. Louis, Mo	Dr. Luckey	May 23			Investigation visit. Found violation of law relative to importation and quarantining of cattle..
Terminal Railway Assn. and Wiggins Ferry Co	St. Louis, Mo	Dr. Luckey	May 24			Investigation visit. Found violation of law relative to importation and quarantining of cattle.
Robert Schirmer	Clayton, Mo	Secretary Wilson	May 26	1 Jersey cow	Tuberculosis	Destruction according to law.
J. M. Schney	St. Louis, Mo	Attending veterinarian	June 17	1 bay gelding	Glanders and farcy	Destruction and disinfection.
St. Louis Basket & Box Co.	St. Louis, Mo	By owner	August 1	1 mare and 1 gelding	Farcy and chronic glanders	Destruction and disinfection.
Missouri Pressed Brick Co.	St. Louis, Mo	By owner	August 1	2 mules	Gangrene of the lungs	One dead before arrival; the other isolated and treated.
Jno. L. Linderker	St. Louis, Mo	By owner	August 9	1 bay stallion	Nasal gleet	Appropriate treatment.
Theodore Miller	St. Louis, Mo	Ass't Sec. Nelson	August 12	1 bay gelding	Glanders	Destruction and disinfection.
Wm. H. Jeffries	St. Louis, Mo	By owner	August 18	1 bay gelding	Glanders	Destruction and disinfection.
Adolph Klinglee	St. Louis, Mo	Secretary Wilson	October 11	1 bay gelding	Glanders	Destruction and disinfection.
Conrad Barkey	St. Louis, Mo	By neighboring teamster	October 19	1 chestnut gelding	Glanders	Destruction and thorough disinfection.
Martin Schwerdt	Warrenton, Mo	Secretary Wilson	October 25	1 bay gelding	Gangrene of lungs	Appropriate treatment.
Herman Pauzer	St. Louis, Mo	Fire department	October 29	1 dog	Rabies	Advised destruction.
August Koenemann	St. Louis, Mo	Dr. Luckey	October 31	1 mule	Glanders	Destruction and disinfection.
W. H. Pollard	St. Louis, Mo	Secretary Wilson	November 6	1 bay gelding	Glanders and farcy	Destruction and disinfection.
M. J. Smith	St. Louis, Mo	Dr. Crowley	November 28	1 mare	Acute glanders and farcy	Destruction and disinfection.
W. A. Godbey	St. Louis, Mo	Secretary Wilson	November 25	1 bay gelding	Suspected glanders	Isolated and given Mallein test.
W. A. Godbey	St. Louis, Mo	Return visit	November 29	1 bay gelding	Glanders and farcy	Destruction and disinfection.

ANNUAL REPORT OF DR. R. B. LOVE, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
Jno. Vickers	Thornfield, Mo	Dr. Luckey	April 30	1 horse	Celulitis	Quarantined as a matter of precaution and given regular treatment.
Louis Potter and others	Aurora, Mo	Secretary Wilson	August 31	Cattle	Blackleg	Advised vaccination.
J. W. Billings	Lebanon, Mo	Secretary Wilson	July 15	1 bay mare	Ulcerated tooth	Advised treatment.
J. W. Billings	Lebanon, Mo	Return visit	July 21	1 bay mare	Ulcerated tooth	Operation by veterinarian.
W. L. Kimball	Weaubleau, Mo	Wire	August 31	5 head stock	Catarrhal fever, etc.; no two alike	Treatment.
F. E. Brown	Springfield	Agent of Frisco Ry	September 15	3 head cattle	Texas fever	Quarantined; advised tick eradication.

ANNUAL REPORT OF DR. I. H. McELROY, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
L. W. Curry, William Lynch, Joseph McElvain and Robert Ware	Allendale, Mo	Secretary Wilson	October 24	Sheep	Scabies	Affected animals quarantined; advised dipping every 10 days with creosote dip until cured.
James Claypool and Irvin Branson	Grant City, Mo	Secretary Wilson	October 25	Sheep	Scabies	Affected animals quarantined; advised use of creosote dip.
William Bowlin	Worth, Mo	Secretary Wilson	October 26	Sheep	Scabies	Affected animals quarantined; advised use of creosote dip.
A. J. Hill	Denver, Mo	Secretary Wilson	October 27	Sheep	Scabies	Affected animals quarantined; advised use of creosote dip.

ANNUAL REPORT OF DR. R. J. MITCHELL, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
W. J. Summers	Kirksville, Mo	Dr. Luckey	October 17	1 horse	Purpura haemorrhagica	Horse dead before arrival.

ANNUAL REPORT OF DR. R. C. MOORE, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
Walter Eyler	Kansas City, Mo	Owner	January 8	1 sorrel gelding	Chronic glanders	Quarantined and reported to county court.
Dr. A. Trickett	Kansas City, Mo	Owner	January 11	1 bay gelding horse	Glanders	Destroyed by consent of owner without appraisement.
Willis Burton	Kansas City, Mo	Owner	January 12	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
Joe White	Kansas City, Mo	Owner	January 12	1 bay gelding horse	Glanders	Destroyed by consent of owner without appraisement.
J. S. Wolf	Kansas City, Mo	Owner	January 13	1 gray gelding horse	Chronic glanders	Quarantined and reported to county court.
Grant McElroy	Kansas City, Mo	Owner	January 13	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
Bert Tomer	Kansas City, Mo	Brought by owner	January 14	1 horse	Glanders	Destroyed by consent of owner without appraisement.
Halliwell Cement Co	Kansas City, Mo	Owner	January 14	1 roan gelding	Chronic glanders	Quarantined and reported to county court.
Smith Baking Co	Kansas City, Mo	Owner	January 15	1 gray gelding	Chronic glanders	Quarantined and reported to county court.
Mr. Crouse	Harlem, Mo	Geo. Totman	January 15	1 chestnut mare	Suspected glanders	Held for Mallein test and further investigation.
J. Dresser	Kansas City, Mo	Owner	January 17	1 chestnut gelding	Suspected glanders	Held for Mallein test and further investigation.
Robert Johnson	Kansas City, Mo	Owner	January 17	1 bay gelding horse	Suspected glanders	Mallein test given; no reaction; horse died January 21 of gangrenous pneumonia.
J. Dresser	Kansas City, Mo	Return visit	January 18	1 chestnut gelding	Suspected glanders	Mallein test given; no reaction.
W. B. Modie	Independence, Mo	Owner	January 19	1 bay mare	Chronic glanders	Quarantined and reported to county court.
Wm. Crouse	Harlem, Mo	Return visit	January 20	1 sorrel mare	Chronic glanders	Quarantined and reported to county court.
Grant McElroy	Kansas City, Mo	Return visit	January 20	1 stable		Found clean and disinfected.
Miss Ruth Patterson	Kansas City, Mo	Owner	January 21	1 bay mare	Chronic glanders	Quarantined and reported to county court.
Willis Burton	Kansas City, Mo	Return visit	January 22	1 stable		Found clean and disinfected.
C. Higenbottom	Kansas City, Mo	Dr. Riggs	January 24	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
J. S. Wolf	Kansas City, Mo	Return visit	January 24	1 stable		Found clean and disinfected.
A. E. Suydam	Kansas City, Mo	Owner	February 1	1 dun gelding	Suspected glanders.	
W. E. Tahner	Kansas City, Mo	Owner	February 1	1 gray gelding	Chronic glanders	Quarantined and reported to county court.
J. F. Cole	Kansas City, Mo	Dr. Gatchell	February 2	1 roan mare	Chronic glanders	Quarantined and reported to county court.
Hyde Park Stable	Kansas City, Mo	Owner	February 3	1 bay gelding	Chronic glanders	Destroyed without appraisement.
H. Hyson	Kansas City, Mo	Dr. Gatchell	February 7	1 brown mule	Glanders	Quarantined and reported to county court.
F. H. Williams	Harlem, Mo	Owner	February 7	1 horse		Party not found.
C. B. Seymour	Kansas City, Mo	Dr. Brown	February 8	1 roan horse	Chronic glanders	Quarantined and reported to county court.
Geo. Tumeno	Kansas City, Mo	Owner	February 9	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
John Johnson	Kansas City, Mo	Humane Officer Cox	February 9	1 roan gelding	Elephantiasis.	
Urban & ———	Kansas City, Mo	Humane Officer Cox	February 10	1 black mare	Chronic glanders	Destroyed without appraisement.
H. Aaron	Kansas City, Mo	Owner	February 10	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
T. H. Williams	Harlem, Mo	Owner	February 11	1 gray gelding	Ulcerated tooth	
Home Scale Co	Kansas City, Mo	Dr. Gatchell	February 14	1 gray gelding	Chronic glanders	Quarantined and reported to county court.
A. W. Gile	Kansas City, Mo	Humane Officer Cox	February 14	2 bay geldings	Suspected glanders	Held in quarantine.

REPORT OF DR. R. C. MOORE—Continued.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910			
J. P. Walton	Kansas City, Mo.	Owner	February 17	1 bay gelding	Chronic glanders.	Destroyed without appraisement.
Geo. Tumeno	Kansas City, Mo.	Return visit	February 17	1 stable		Found clean and disinfected.
Urban	Kansas City, Mo.	Return visit	February 18	1 stable		Found clean and disinfected.
H. Aaron	Kansas City, Mo.	Return visit	February 18	1 stable		Found clean and disinfected.
S. P. Forsee	Kansas City, Mo.	Owner	February 20	1 bay gelding mule	Chronic glanders	Quarantined and reported to county court.
G. J. Buckley	Kansas City, Mo.	Owner	February 20	1 gray mare	Suspected glanders	Held for further investigation.
Salvation Army	Kansas City, Mo.	Letter from secretary Team Owners' Assn	March 2	1 stable		Found clean and horses healthy.
Smith Yost Pie Co	Kansas City, Mo.	Dr. Merker	March 5	1 bay gelding	Suspected glanders	Held for development.
Smith Yost Pie Co	Kansas City, Mo.	Owner	March 7	1 bay gelding	Suspected glanders	Held for development.
Will Willard	Kansas City, Mo.	Sheriff's office	March 13	1 horse and 1 mule	Strangles.	
A. J. Gray	Kansas City, Mo.	Dr. Hickman	March 14	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
Charles W. Reed	Kansas City, Mo.	Dr. Brown	March 15	1 bay mare	Chronic glanders	Quarantined and reported to county court.
Murphey Feed & Coal Co.	Kansas City, Mo.	Dr. Hickman	March 16	1 brown gelding	Chronic glanders	Quarantined and reported to county court.
Hydraulic Pressed Brick Co.	Kansas City, Mo.	Owner	March 17	1 bay mare	Chronic glanders	Quarantined and reported to county court.
Unknown	Kansas City, Mo.	Mr. Ray	March 19	1 horse	Suspected glanders	
Unknown	Kansas City, Mo.	Humane Officer Cox.	March 20	1 horse	Suspected glanders	Destroyed and removed before my arrival.
I. H. Baker	Kansas City, Mo.	Owner	March 29	1 horse	Necrotic lung.	
Al Bales	Kansas City, Mo.	Owner	April 1	1 bay gelding	Nasal catarrh.	
Jno. Tungett	Kansas City, Mo.	Dr. Hickman	April 5	1 gray gelding	Chronic glanders	Quarantined and reported to county court.
S. C. Skinner	Kansas City, Mo.	Dr. Merker	April 13	1 bay mare	Chronic glanders	Quarantined and reported to county court.
Unknown	Kansas City, Mo.	Dr. Gatchel	April 13	1 gray gelding	Suspected glanders	Held for further investigation.
Thomas Cain	Kansas City, Mo.	Dr. Gatchel	April 15	1 horse	Chronic glanders	Quarantined and reported to county court.
C. H. Pratt	Kansas City, Mo.	Humane officer	April 15	1 horse	Chronic glanders	Quarantined and reported to county court.
Dierks Lumber Co.	Kansas City, Mo.	Owner	April 15	2 horses	Suspected glanders	Held for further investigation.
Dierks Lumber Co.	Kansas City, Mo.	Return visit	April 21	10 horses	Suspected glanders	Held for further investigation.
F. M. Stultz	Kansas City, Mo.	Dr. Moberly	April 22	1 horse	Suspected glanders	Held for investigation.
Unknown	Sheffield	Humane Officer Cox.	April 30	1 bay gelding	Chronic nasal catarrh.	
Dierks Lumber Co	Kansas City, Mo.	Return visit	May 2	1 roan gelding	Suspected glanders	Mallein test; advised thorough and complete disinfection of premises.
H. M. Howell	Kansas City, Mo.	Owner	May 10	1 bay mare	Chronic glanders	Mallein test; advised complete and thorough disinfection of premises.
Jno. B. Flucke	Kansas City, Mo.	Owner	May 13	1 bay gelding	Chronic glanders	Mallein test. Reported to county court.
12th St. Dairy	Kansas City, Mo.	Dr. Gatchel	May 14	1 gray mare	Chronic glanders	Quarantined and reported to county court.
J. B. Stringfellow	Kansas City, Mo.	Owner	May 17	1 black gelding	Lymphangitis.	

Joe Richienello	Kansas City, Mo.	Owner	May 19.	1 spotted gelding	Chronic glanders	Quarantined and reported to county court.
Johnson Coffee Co.	Kansas City, Mo.	Dr. Gatchel	May 20.	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
Sherd Ashbrook	Kansas City, Mo.	Humane officer	May 21	1 bay gelding	Chronic glanders.	Quarantined and reported to county court.
Sherd Ashbrook	Kansas City, Mo.	Humane officer	May 22	1 chestnut gelding	Suspected glanders	Mallein test; no reaction.
N. Ryan	Kansas City, Mo.	Dr. Merker	May 23	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
David Glass	Kansas City, Mo.	Owner	May 23	2 bay geldings	Chronic glanders	Quarantined and reported to county court.
J. A. Thorpe	Kansas City, Mo.	Owner	May 24	1 gray mare	Suspected glanders	Held for further investigation.
J. P. Lynch	Kansas City, Mo.	Found on street	May 24	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
A. R. Thorpe	Kansas City, Mo.	Owner	May 28	1 gray mare	Suspected glanders	Mallein test.
Unknown	Hickman Mills, Mo.	C. S. Campbell	June 11	1 bay gelding	Suspected glanders.	
Will Shadowens	Kansas City, Mo.	Owner	June 16	1 roan gelding	Suspected glanders	Held for further investigation.
Will Shadowens	Kansas City, Mo.	Return visit	June 18	1 roan gelding	Suspected glanders	Mallein test.
Joe Garrigorda	Kansas City, Mo.	Owner	June 24	1 bay mare	Glanders	Destroyed without appraisement.
F. M. Slutz	Kansas City, Mo.	Owner	June 24	1 black mare	Glanders	Quarantined and reported to county court.
Sheehy Transfer Co	Kansas City, Mo.	Owner	June 28	1 gray gelding	Suspected glanders	Quarantined and reported to county court.
A. L. Leonard	Kansas City, Mo.	Dr. Gatchel	June 29	1 horse	Suspected glanders	Destroyed by owner.
Jno. Dawson	Kansas City, Mo.	Policeman	July 2	1 bay mare	Gangrenous pneumonia	Destroyed.
F. J. Curtright	Kansas City, Mo.	Dr. Gatchel	July 8	1 bay mare mule	Chronic glanders	Quarantined and reported to the county court.
Arnest Christopoulos	Kansas City, Mo.	Dr. Gatchel	July 8	1 bay gelding	Chronic glanders	Quarantined and reported to the county court.
Unknown	Kansas City, Mo.	Dr. Gatchel	July 13	1 horse	Suspected glanders	Not found.
Sam Marrs	Kansas City, Mo.	Dr. Van Dusen	July 14	1 gray gelding	Chronic glanders	Quarantined and reported to county court.
S. S. Spence	Kansas City, Mo.	Owner	July 14	1 bay mare	Chronic glanders	Reported to county court.
Jno. Shaw	Kansas City, Mo.	Dr. Gatchel	July 18	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
Hy. Knake	Kansas City, Mo.	Dr. Silverforb	July 24	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
Jordan Reed	Kansas City, Mo.	Dr. Gatchel	July 26	1 sorrel gelding	Chronic glanders	Quarantined.
Frank Cormick	Kansas City, Mo.	Owner	July 27	1 gray mare	Chronic glanders	Quarantined.
G. Karst	Kansas City, Mo.	Dr. Gatchel	July 27	1 bay gelding	Chronic glanders	Quarantined.
H. W. Cross	Kansas City, Mo.	Owner	July 28	1 bay stallion	Purulent celulitis of fetlock	
Frank Cormick	Kansas City, Mo.	Return visit	August 3	Inspected stables.		
Joseph Silverforb	Kansas City, Mo.	Dr. Silverforb	August 3	1 bay gelding	Chronic glanders	Quarantined.
Square Transfer Co.	Kansas City, Mo.	Owner	August 3	1 gray gelding	Suspected glanders	Held for further investigation.
John Reed	Kansas City, Mo.	Return visit	August 4	Stable inspection.		
E. E. Deming	Kansas City, Mo.	Owner	August 5	1 gray gelding	Chronic glanders	Quarantined and reported to county court.
Harry Mansfield	Kansas City, Mo.	Dr. Silverforb.	August 6	1 bay gelding	Chronic glanders	Quarantined.
Champlain Vinegar Co.	Kansas City, Mo.	Owner	August 8	1 gray gelding	Suspected glanders	Held for further investigation.
Joe Kreiger	Kansas City, Mo.	Humane officer	August 10	1 dun gelding	Chronic glanders	Not found.
Mr. Owen	Kansas City, Mo.	Humane officer	August 10	1 horse.		
Frederick A. Raichley	Kansas City, Mo.	Owner	August 12	1 gray gelding	Chronic glanders	Quarantined and reported to county court.
T. F. Branscum	Kansas City, Mo.	Owner	August 18	1 bay gelding	Suspected glanders	Held for investigation.
D. M. Rose	Kansas City, Mo.	Owner	August 19	1 bay gelding	Suspected glanders.	Held for investigation.

REPORT OF DR. R. C. MOORE—Continued.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
Dickey Dairy Co	Kansas City, Mo	Humane officer	August 20	1 black gelding	Chronic glanders	Quarantined.
Mr. Williams	Kansas City, Mo	Telephone message from unknown party	August 21	1 bay gelding	Nasal catarrh	Held for further investigation.
Dickey Dairy Co	Kansas City, Mo	Return visit	August 22	Stable inspection.		
Snydam Baking Co	Kansas City, Mo	B. Howard Smith	August 23	1 bay gelding	Catarrh gutteral pouches	Returned to work.
Smith Baking Co	Kansas City, Mo	Owner	August 24	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
Rose Commission Co	Kansas City, Mo	Owner	August 25	1 bay gelding	Chronic glanders	Reported to county court.
Rose Commission Co	Kansas City, Mo	Owner	August 25	1 bay gelding	Glanders	Reported to county court.
8th St. Dairy Co	Kansas City, Mo	Owner	August 27	2 geldings	Suspected glanders	Held for test.
J. Eisenberg	Kansas City, Mo	Dr. Merker	August 28	1 gray gelding	Chronic glanders	Quarantined.
J. W. Long	Kansas City, Mo	Owner	August 30	1 gray gelding	Suspected glanders	Quarantined and held for test.
	Plattsburg, Mo	Dr. Shikles	September 1	Cattle	Suspected Texas fever.	
Unknown	Kansas City, Mo	Humane Officer Young	September 3	1 horse		No such number found.
Unknown	Kansas City, Mo		September 4	1 bay gelding	Infected wound of right stiffle	Destroyed.
Mr. Cart	Raytown	Mr. Schaiblan	September 5	1 roan gelding	Chronic bronchial pneumonia.	
J. W. Long	Kansas City, Mo	Humane Officer Cox.	September 5	1 gray gelding	Suspected glanders	Held for Mallein test.
Interstate Ice Co	Kansas City, Mo	Owner	September 8	1 bay gelding	Suspected glanders	Held for Mallein test.
Interstate Ice Co	Kansas City, Mo	Dr. Tricket	September 10	1 bay gelding	Chronic glanders	Destroyed with consent of owner.
J. W. Long	Kansas City, Mo	Return visit	September 12	Stable inspection.		
A. Affronti	Kansas City, Mo	Humane Officer Cox.	September 15	1 gray gelding	Suspected glanders	Held for further investigation.
A. Affronti	Kansas City, Mo	Return visit	September 23	1 gray gelding	Suspected glanders	Held for investigation.
A. B. C. Butter Co	Kansas City, Mo	Dr. Stewart	September 23	1 bay mare	Chronic glanders	Destroyed by consent of owner.
David Cocher	Kansas City, Mo	Humane Officer Cox.	September 26	1 sorrel gelding	Chronic glanders	Quarantined.
G. Arnone	Kansas City, Mo	Dr. Riggs	October 4	1 bay mare	Chronic glanders	Quarantined and reported to county court.
A. Affronti	Kansas City, Mo	Return visit	October 4	1 gray gelding	Chronic glanders	Quarantined and reported to county court.
Unknown	Kansas City, Mo	Telephone	October 5			Nothing found.
L. L. Curtis	Kansas City, Mo	Dr. Merker	October 7	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
Edw. Freidson	Kansas City, Mo	Dr. Werner	October 7	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
Mr. Jackson	Kansas City, Mo	Owner	October 8	1 bay gelding	4 upper molars ulcerated.	
C. R. Deeter	Kansas City, Mo	Dr. Nickol	October 9	1 chestnut gelding	Chronic glanders	Quarantined and reported to county court.
James E. Flanders	Kansas City, Mo		October 9	1 bay gelding	Chronic glanders	Quarantined and reported to county court.
C. R. Deeter	Kansas City, Mo	Return visit	October 11	1 black gelding	Suspected glanders	Held for investigation.

Geo. Schrader	Kansas City, Mo		October 12	1 black mare	Suspected glanders	Held for investigation.
Ben Shepard	Kansas City, Mo		October 14	1 bay gelding	Suspected glanders	Held for investigation.
C. R. Deeter	Kansas City, Mo	Return visit	October 17	Stable inspection.		
Jas. E. Flanders	Kansas City, Mo	Owner	October 21	1 brown gelding mule	Suspected glanders	Held for investigation.
Wm. Arnold	Kansas City, Mo		October 22	1 bay gelding	Suspected glanders	Held for investigation.
Mr. Tarwater	Kansas City, Mo	Telephone	October 23	1 horse	Ulcerated tooth.	
J. E. Flanders	Kansas City, Mo	Owner	October 23	1 bay gelding	Chronic glanders	Quarantined.
K. C. Mantle Co.	Kansas City, Mo	Owner	October 27	1 bay gelding	Chronic glanders	Destroyed without appraisement.
W. Turville	Kansas City, Mo	Owner	October 28	1 bay gelding	Suspected glanders	Quarantined.
Wm. Arnold	Kansas City, Mo	Owner	November 1	1 bay gelding	Chronic glanders	Quarantined.
Tom Porter	Kansas City, Mo	Humane Officer Cox	November 5	1 sorrel gelding	Chronic glanders	Destroyed by Officer Cox.
Tom Johnson	Kansas City, Mo	Humane Officer Cox.	November 10	1 bay gelding	Chronic glanders	Destroyed by consent of owner.
F. Flanders	Kansas City, Mo	Owner	November 14	1 gray gelding	Suspected glanders	Held for development.
Mrs. Maggie Goodwin	K. C. R. No. 5	Dr. Werner	November 16	1 black stallion	Chronic glanders	Quarantined.
S. Lashbrook	Kansas City, Mo	Humane Officer Cox	November 17	2 geldings	Suspected glanders.	
Tom Jaws	Kansas City, Mo	Owner	November 17	1 bay gelding	Chronic glanders	Destroyed without appraisement.
S. Lashbrook	Kansas City, Mo	Owner	November 21	2 geldings	Chronic glanders	Quarantined.
Alek Hoeck	Kansas City, Mo	Dr. Stewart	November 22	1 black gelding	Chronic glanders	Destroyed by consent of owner.
F. Flanders	Kansas City, Mo	Owner	November 22	1 gray gelding	Chronic glanders	Quarantined.
Barney Maloy	Kansas City, Mo	Dr. Gatchel	November 25	1 gray gelding	Chronic glanders	Quarantined.
W. L. Grush Com'sn Co.	Kansas City, Mo	Dr. Hickman	November 25	1 gray gelding	Suspected glanders	Held for further investigation.
W. L. Grush	Kansas City, Mo	Return visit	November 27	1 gray gelding	Glanders	Mallein test. Reacted.
Matthaeis Bakery	Kansas City, Mo	Owner	November 27	1 chestnut gelding	Glanders	Quarantined.

ANNUAL REPORT OF DR. F. M. O'BRIEN, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
L. Kitteon	Elsberry, Mo	Letter from Dr. Luckey	March 18	Horse	Reported glanders	Dead and disposed of before my arrival.
R. P. Dwyer	Silex, Mo	Letter from Dr. Luckey	March 31	2 cattle	Uncephalitis	Died before call.
Gibbons Bros.	Edina, Mo	Secretary Wilson	September 3	Horses	Various diseases	Advised to move all horses from marshy pastures.

ANNUAL REPORT OF DR. C. N. SCOTT, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
Charles Walters and Wm. Cloepfil	Rockport, Mo	Return visit for Dr. L. D. Brown	1910. April 18	Mules	Glanders	Animals found free from glanders and quarantine removed.
Peter Maurir	Graham, Mo	Return call for Dr. Wolf	October 14	1 bay horse	Glanders	Condemned and reported to county court.

ANNUAL REPORT OF DR. J. HARVEY SLATER, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
Geo. Morris	Hale, Mo	Dr. Luckey	1909. December 28	Cattle		4 dead and buried on arrival, two convalescent and two well; unable to diagnose case.
C. D. Felt	Mendon, Mo	Secretary Ellis	December 28	430 sheep	Foot rot	Released from quarantine and sold.
Wm. Gilby	Lawson, Mo	Return visit	1910. February 26	Inspection visit	Glanders	Found remaining horses free from glanders.

ANNUAL REPORT OF DR. STANLEY SMITH, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
Steve Fry		Secretary Ellis	1910. February 1	2 mares	1 mare had catarrhal fever, other purpura.	
H. H. Miller	Steadman, Mo	Secretary Wilson	August 5	15 cattle	Texas fever	Quarantined.

ANNUAL REPORT OF DR. H. C. TUCK, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
Henry C. Rauscher	Chesterfield, Mo	Return visit	January 27	1 cow	Tuberculosis	Destruction as prescribed by law.
Frank L. Meyer	Chesterfield, Mo	Owner	February 2	1 cow	Tuberculosis	Destruction as prescribed by law.
State Hospital No. 4	Farmington, Mo	Dr. Luckey	February 8	11 cows	Tuberculosis	Destruction as prescribed by law.
E. T. Cameron	Hannibal, Mo	Application	March 3	2 cows	Tuberculosis	Isolation until appraisement, then slaughter at packing plant under federal meat inspection.
J. P. Holland	Hannibal, Mo	Application	March 11	2 cows	Tuberculosis	Quarantined.
J. R. Little	Hannibal, Mo	Application	March 19	1 cow	Tuberculosis	Quarantined.
C. P. Hallenberger	Hannibal, Mo	Secretary Wilson	March 25	1 cow	Tuberculosis	Quarantined.
McIntyre & Maples	New London, Mo	Application	April 1	1 cow	Tuberculosis	Quarantined.
S. D. Bowen	Hannibal, Mo	Application	April 5	1 bull	Tuberculosis	Quarantined.
J. M. Baskett	Hannibal, Mo	Application	April 8	11 cattle	Tuberculosis	Isolation and disinfection of premises.
Chas. T. Catron	Hannibal, Mo	Application	April 8	1 cow	Tuberculosis	Quarantined.
Mrs. James E. King	Withers Mill, Mo	Application	April 12	1 cow	Tuberculosis	Quarantined.
James Starks	Withers Mill, Mo	Application	April 12	1 cow	Tuberculosis	Quarantined.
Charles Taylor	Palmyra, Mo	Application	April 14	1 cow	Tuberculosis	Quarantined.
Mrs. Helen K. Garth	Hannibal, Mo	Application	April 20	1 cow, Artis Gerben, No. 69007	Tuberculosis	Quarantined.
C. F. Horstmeyer	New London, Mo	Application	April 27	1 bull	Tuberculosis	Quarantined.
R. H. Gentry	New London, Mo	Application	April 29	1 cow	Tuberculosis	Quarantined.
C. H. Lennox	New London, Mo	Application	April 29	1 cow	Tuberculosis	Quarantined.
H. E. Williams	Withers Mill, Mo	Application	May 5	1 bull	Tuberculosis	Quarantined.
B. F. Drake	Hannibal, Mo	Application	May 11	1 cow	Tuberculosis	Quarantined.
Mrs. J. D. Conn	Rimby, Mo	Dr. Luckey	May 15	1 mare	Suspected glanders	Isolation for further investigation.
Mrs. J. D. Conn	Rimby, Mo	Return visit	June 18	1 mare	Chronic glanders	Destruction as prescribed by law.
L. J. Downen	Goodman, Mo	By owner	October 1	1 gelding	Mal-nutrition	Tonics and good feed.
Samuel Prater	Pineville, Mo	By owner	October 22	2 steers	Forage poisoning	Change of pasture.

NOTE—Dr. Tuck is employed regularly in testing herds of cattle for tuberculosis and on Texas fever eradication work in south Missouri. Work shown in the above table was only incidental.

ANNUAL REPORT OF DR. H. C. WARD, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
Clean Milk Dairy Co.	Jarvis, Mo	Secretary Wilson	November 10	1 cow	Tuberculosis	Quarantined.
C. S. Parker	Concordia, Mo	Secretary Wilson	November 22	1 bull	Tuberculosis	Quarantined.

ANNUAL REPORT OF DR. H. H. WOLF, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
Samuel Corrough	Arkoe, Mo	Dr. Luckey	March 23	1 steer	Anthrax	Advised vaccination of healthy animals and isolation of sick ones.

ANNUAL REPORT OF DR. W. B. WELCH, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
C. F. Lichte	Lexington, Mo	Secretary Ellis	February 13	6 cattle	Encephalites	Change of feed and prescribed treatment.

ANNUAL REPORT OF DR. T. E. WHITE, DEPUTY STATE VETERINARIAN, FOR YEAR DEC. 17, 1909, TO DEC. 17, 1910.

Owner.	Postoffice.	How called.	Date.	Kind of stock.	Disease.	How disposed of.
			1910.			
Jno. F. Vick	Vermont, Mo	Secretary Wilson	October 27	Cattle	Septic blood poisoning	Four dead before I arrived; advised keeping cattle away from infected pond.

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